ORDER NO. VRD-8109-988

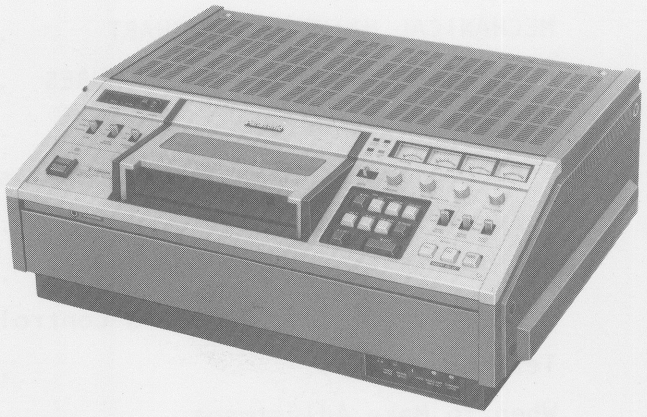
Service Manual

Editing Video Cassette Recorder
Panasonic U-vision

AU-700

Vol. 2

Mechanical Adjustment Procedures
Electrical Adjustment Procedures



SPECIFICATIONS

Power Source: AC 100/120/220/240 V (Selectable), 60/50 Hz
Power Consumption: Approx. 140 watts
Television System: EIA Standard (525 lines, 60 fields) NTSC color signal
Video Recording System: 2 rotary heads, helical scanning system
Luminance: frequency modulation recording
Color signal: converted subcarrier, direct recording
Audio Track: 2 tracks
Tape Format: Tape width 3/4 inch (19 mm), high density tape
Tape Speed: 3-3/4 i.p.s. (95.3 mm/s)
Vow Flutter: Less than 0.1% rms
Record/Playback Time: 60 min. with NV-P26
FF/REW Time: Less than 5.0 min. with NV-P26
Heads:
Video: 2 rotary heads
Audio/Control: 1 stationary head
Control (P.B. only)/Time code (Rec/P.B.): 1 stationary head
Erase: 1 full track erase
2 selectable audio erase tracks for editing
2 flying (rotary) erase heads

Input Level:
Video: TV Monitor connector (8 P)
1.0 Vp-p, 75Ω unbalanced
VIDEO IN connector (BNC) × 2
1.0 Vp-p, 75Ω unbalanced
Dub In Connector (7 P):
chroma level 0.9 Vp-p,
luminance level 1.0 Vp-p,
Audio: TV Monitor connector (8 P)
−20 dB, 100 kΩ unbalanced
MIC (XLR) × 2
−60 dB, 600Ω balanced
LINE IN (XLR) × 2 +4 dB, 600Ω/high impedance balanced
Sub carrier: (BNC)
2.0 Vp-p, 75Ω unbalanced
Composite sync: (BNC)
4.0 Vp-p, negative pulse, 75Ω unbalanced
Time code: (RCA)
1.0 Vp-p, 10 kΩ unbalanced

Output Level:
Video: TV Monitor connector (8 P)
1.0 Vp-p, 75Ω unbalanced
VIDEO OUT connector (BNC) × 2
1.0 Vp-p, 75Ω unbalanced
Dub Out Connector (7 P):
chroma level 0.9 Vp-p,
luminance level 1.0 Vp-p,
Audio: TV Monitor connector (8 P)
0 dB, 5 kΩ unbalanced
LINE OUT (XLR) × 2
+4 dB (+4 dB/−6 dB switchable), 600Ω balanced
AUDIO MONITOR OUT jack (RCA)
0 dB, 5 kΩ unbalanced
HEADPHONE jack:
High −26 dB, 8Ω
Low −32 dB, 8Ω
RF out: (BNC) 0.5 Vp-p, 75Ω unbalanced
Time code: (RCA)
2.4 Vp-p, low impedance unbalanced

Video Horizontal Resolution: (on monoscope test pattern)
Color: better than 260 lines
B/W: better than 330 lines
Video Frequency Response: 3 MHz (0 dB)
3.8 MHz (±3 dB)
Audio Frequency Response: 50 ~ 15,000 Hz
Signal-to-Noise Ratio: Video: better than 46 dB (Color)
better than 50 dB (B/W)
(Rohde & Schwarz noise meter)
Audio: better than 48 dB
(3% distortion level)
Audio Distortion: Less than 3%

(Continued on page 1.)

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(Continued from cover page.)

Audio Cross Talk:	Better than 40dB
Wow & Flutter:	0.12 rms
Operating Temperature:	41°F ~ 104°F (5°C ~ 40°C)
Operating Humidity:	35% ~ 80%
Weight:	79.2 lbs. (36kg)
Dimensions:	26-1/8″(W) × 9-3/8″(H) × 18-3/4″(D) 661(W) × 238(H) × 475(D) mm
Accessoires Supplied:	1 pc. AC power cord, VJA0129 1 pc. Dubbing cable, VJA0151 1 pc. Dust cover, VFB0006

Optional Accessories:
- 3/4″ video cassette tape:
  - NV-P23 Approx. 610ft. (186m), 30 min.
  - NV-P26 Approx. 1,175ft. (358m), 60 min.
- Head cleaning tape, NV-P20
- Remote control unit, NV-A152
- Editing controller, AU-A70
- Multiple source adaptor, AU-J10
- Editing controller, NV-A960
- Auto Search Controller, NV-A800

Specifications are subject to change without notice.

AU-700 Mechanical Maintenance

MAINTENANCE CHART

We recommend that the following periodic checks be performed to prolong the life of the machine.
Since the parts are keyed to the Inner parts Location Diagram When you replace the following parts, refer to the diagram.

✡ Lubrication
● Cleaning
○ Replacement

	Parts	Ass'y No.	HOUR										Remarks
			500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
	Upper Drum ass'y	VEH0094	●	○	●	○	●	○	●	○	●	○	
	A/C & A/E Head ass'y	VBR0033	●	●	●	●	●	●	●	●	●	●	
	Address Head ass'y	VBS0017	●	●	●	●	●	●	●	●	●	●	
	Capstan Shaft		●	●	●	●	●	●	●	●	●	●	
	Pressure Roller ass'y	VXP0305	●	●	●	●	●	●	●	○	●	●	
	Reel Idler	VDP0762		●		○		●		○		●	
	Reel Table	VXR0078				✡ ●				✡ ●			
	Loading Belt	VDV0018			○			○			○		Replace every 3 years
	Ten. Reg. Belt	VDV0117				○				○			
	Elevator Motor	VDV0119			○			○			○		
	Brake Shoe ass'y	VXL0724			○			○			○		
	S Band ass'y	VXA1158			○			○			○		
	T Band ass'y	VXA1159			○			○			○		
	Reel Motor	VEM0118					○						
	Elevator Motor	VXP0316					○						
	Ten. Reg. Motor	VXP0311					○						
	Loading Motor	VXP0313			○			○			○		
	Slip Ring (brush)	VSA0030			●			●			●		
	Tape guides		●	●	●	●	●	●	●	●	●	●	
	Lower Cylinder		●	●	●	●	●	●	●	●	●	●	Clean lead

MECHANICAL ADJUSTMENT PROCEDURES

DISASSEMBLY METHOD

GENERAL

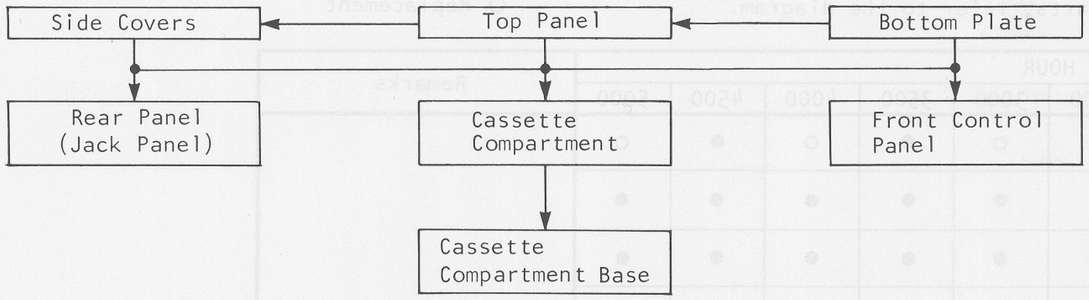


Fig. M1

1. Removal of the Side Covers
   Unscrew the 8 screws (A) on both sides to remove the side covers from the deck frame.

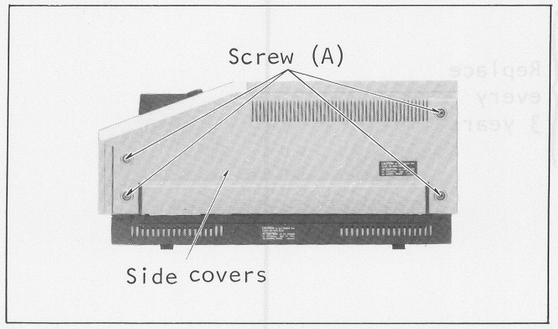


Fig. M2

2. Removal of the Top Panel
   Unscrew the 2 screws (B) and remove the Top Panel.

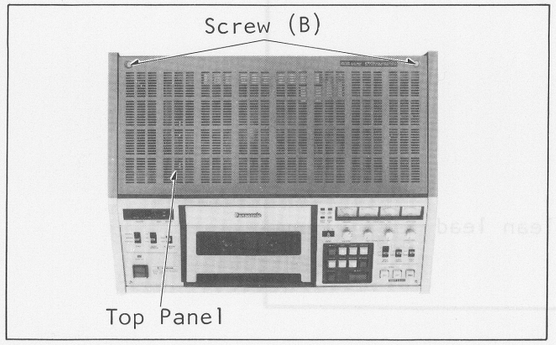


Fig. M3

3. Removal of the Bottom Plate
   Unscrew the 5 screws (C) and remove the bottom plate.

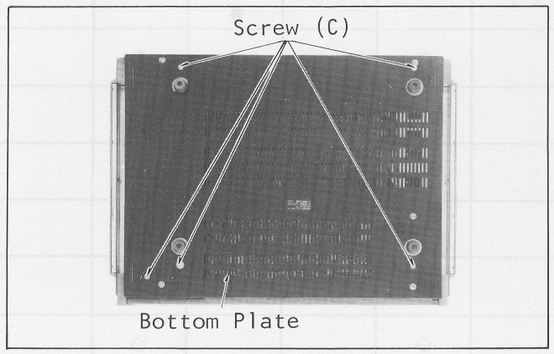


Fig. M4

4. Removal of the Cassette Compartment
   Supply power to the unit, and turn on the power switch.
   Press the EJECT Button to raise the cassette compartment.
   Unscrew the 2 screws (D) securing the cassette compartment to the cassette compartment base and remove the cassette compartment.
   Turn off the power and unplug the unit.

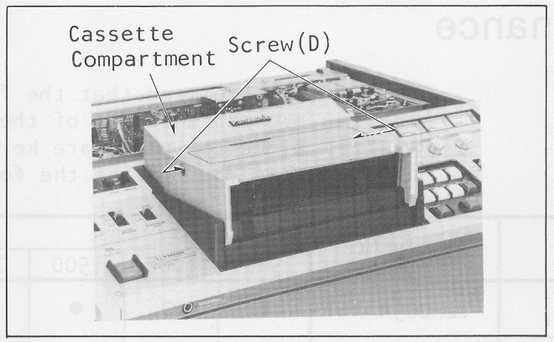


Fig. M5

5. Removal of the Front Control Panel
   Pull off the tracking, audio, and video level knobs (E).
   Unscrew the 6 screws (F) securing the Front Control Panel, and lift off the panel.

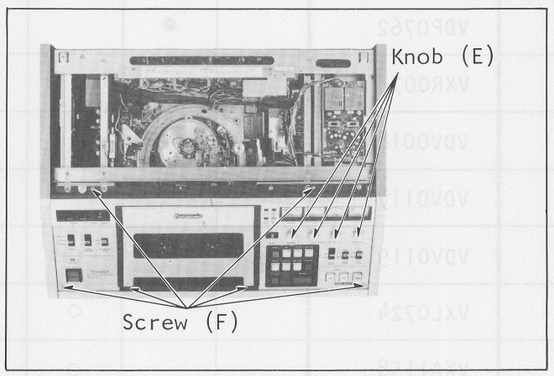


Fig. M6

6. Removal of the Rear Panel
   Unscrew the 4 screws (G) and remove the Rear Panel.

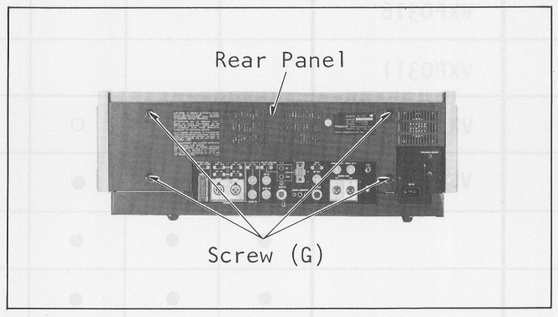


Fig. M7

7. Removal of the Front Panel
   Unscrew the 4 screws (H) and remove the Front Panel.

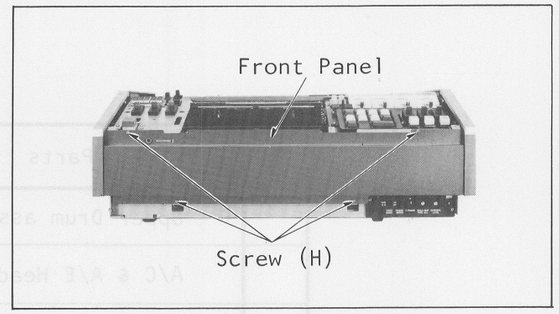


Fig. M8

8. Removal of the Cassette Compartment Base
   Unscrew the 2 screws (I) securing the cassette compartment base to the rack gear shafts and remove the cassette compartment base.

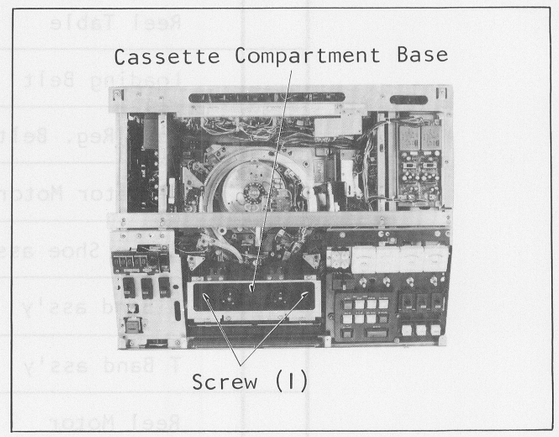


Fig. M9

MECHANICAL MAINTENANCE PROCEDURES

1. D.D CYLINDER ASSEMBLY REPLACEMENT/ ADJUSTMENT

A. Replacement Procedure

1. Remove the Top Panel and the Bottom Plate.
   (Refer to section "DISASSEMBLY METHOD" Item 2, 3.)
2. Unscrew screw (A) securing the brush angle and remove it.

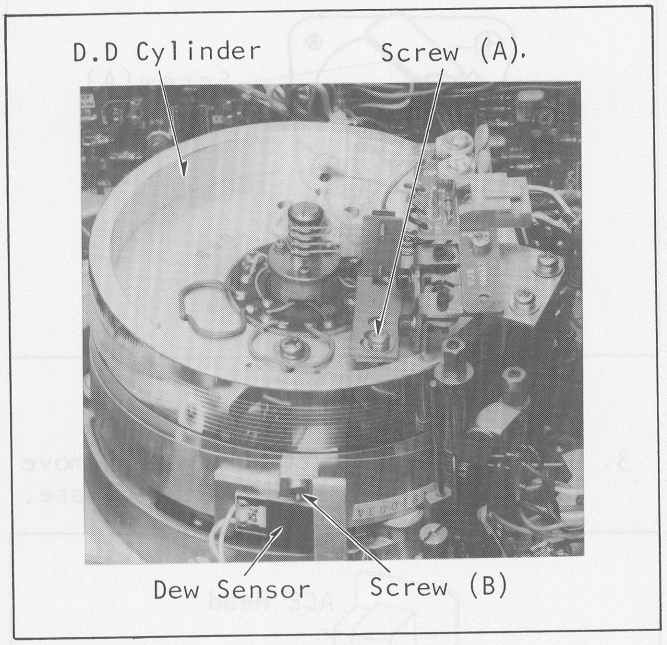


Fig. M10

3. Unscrew screw (B) securing the dew sensor and remove it.
4. Set the unit vertically so that one side panel is on the bench.
5. Unscrew the 4 screws (C) securing the bottom rear board ass'y.

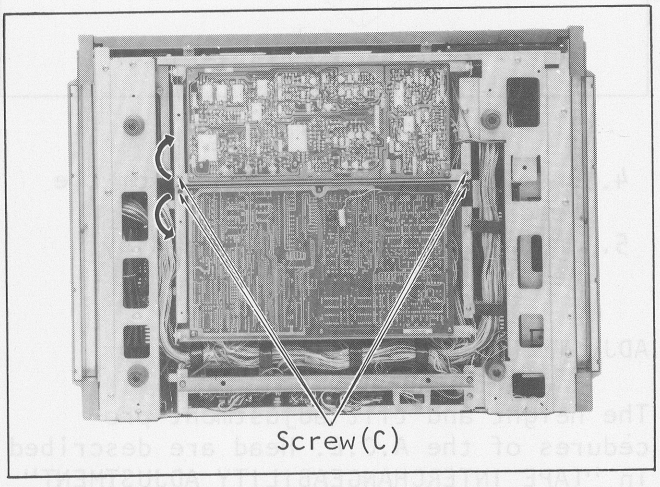


Fig. M11

6. Remove the connectors:
   P6348 on the cylinder P.C.B.,
   P211 on the CAP/CYL Drive/Step P.C.B. and P51, P55 on the Head Amp P.C.B.
7. Unscrew the 3 bolts (D) holding the cylinder and remove the D.D Cylinder Unit Ass'y from the chassis.

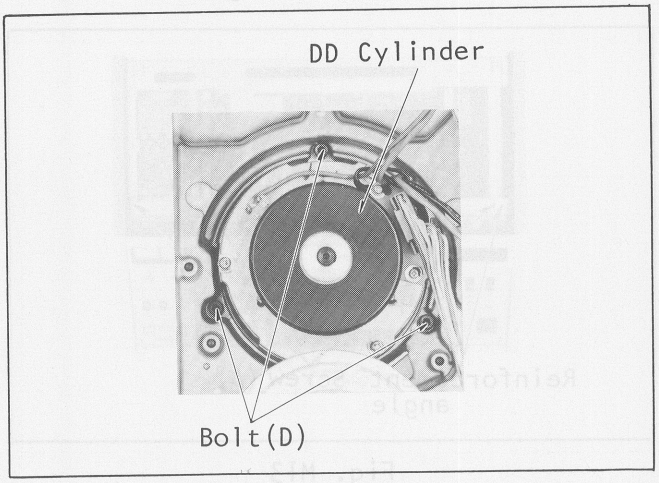


Fig. M12

8. Mount the new cylinder unit assembly reversing the steps above to complete the installation.
9. Notes on assembly
   1. Wipe clean the mounting surface of the cylinder unit and the chassis before assembling.
   2. After assembly, wipe clean the portion of the cylinder unit assembly which contacts the tape with a soft cloth.
   3. Finally, clean the video heads with head cleaner (VFK27).

B. Adjustment Procedure

When the D.D cylinder unit assembly has been replaced or disturbed, tape interchangeability must be checked.
See "TAPE INTERCHANGEABILITY ADJUSTMENT" (Page 2-5 for details).

2. DD CAPSTAN MOTOR REPLACEMENT

* Equipment
  Screw Driver

1. Remove the Top Panel Bottom Plate (Refer to section "DISASSEMBLY METHOD" 2, 3).
2. Loosen the screw (A) and remove the reinforcement angle.

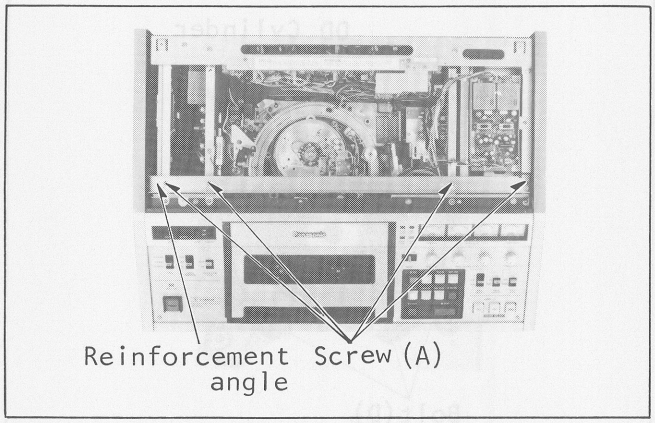


Fig. M13

3. Unscrew the 4 screws (B) securing the bottom rear board ass'y (See Fig. M11).
4. Turn the Loading Motor to clockwise by hand until Loading Gear Hole come to the DD Capstan Motor Screw.

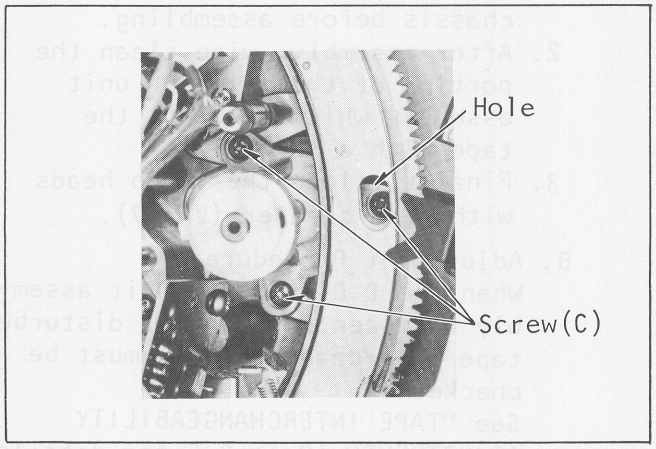


Fig. M14

5. Unscrew the 3 screws (C) and turn the DD Capstan Motor Counter Clockwise about 45°.
6. Remove the DD Capstan Motor.
7. Install a new DD Capstan Motor and reverse the above steps to complete installation.

3. AUDIO CONTROL/AUDIO ERASE HEAD REPLACEMENT

* Equipment
  Screw Driver +

1. Remove the Top Panel (Refer to section "DISASSEMBLY METHOD" 2).
2. Unscrew the 2 screws (A) and remove the A.C.E. Head assembly.

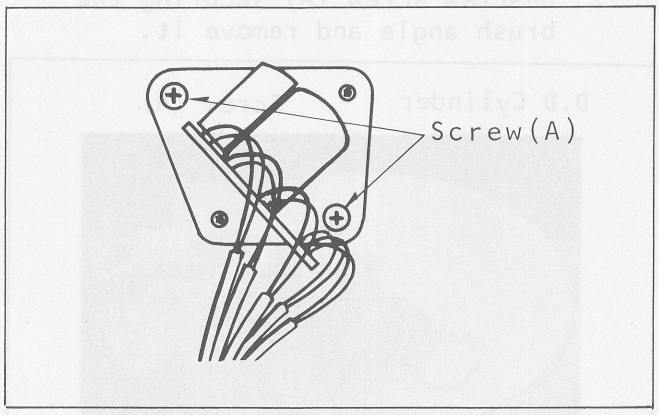


Fig. M15

3. Unscrew the 3 screws (B) and remove the A.C.E. Head from the Head Base.

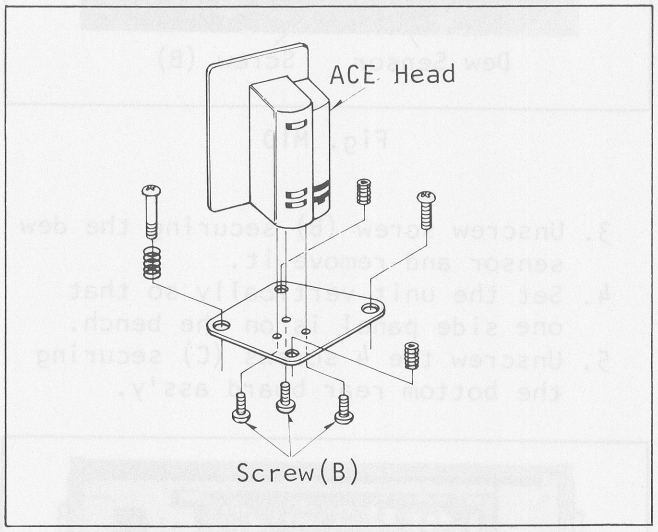


Fig. M16

4. Unsolder the A.C.E. Head from the Head P.C. Board.
5. Install the new A.C.E. Head by reversing the above steps.

ADJUSTMENT PROCEDURE

The height and tilt adjustment procedures of the A.C.E. Head are described in "TAPE INTERCHANGEABILITY ADJUSTMENT" Section Page (2-5).

4. TAPE INTERCHANGEABILITY ADJUSTMENT

* Equipment: Oscilloscope
  Reference Tape VFM2081D
  Hex Wrench VFK76
  Box Wrench VFK0195
* Adjustment Point: Tape Transport
* Test Point:
  Envelope TP1 (Video Playback P.C.B.) (VEP0386B1)
  or RF out Rear Panel
  Ext. Trig. TP4 (Head Amp P.C.B.) (VEP0539A)

A. Pre-adjustment of Posts and Audio/Control Head Height

1. To prevent the alignment tape from being damaged, use a normal cassette tape for the Pre-adjusting procedure.
2. Clean the all parts which contact the tape prior to adjustment.
3. Playback a cassette tape and make sure that the edges of the tape does not curl at the top or bottom guide limits at post P2 or P5.

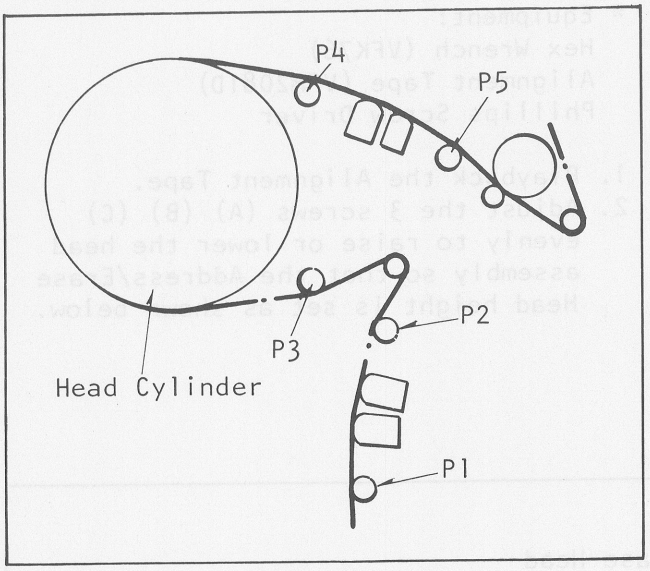


Fig. M17

4. If tape curling occurs, adjust the posts as shown below.

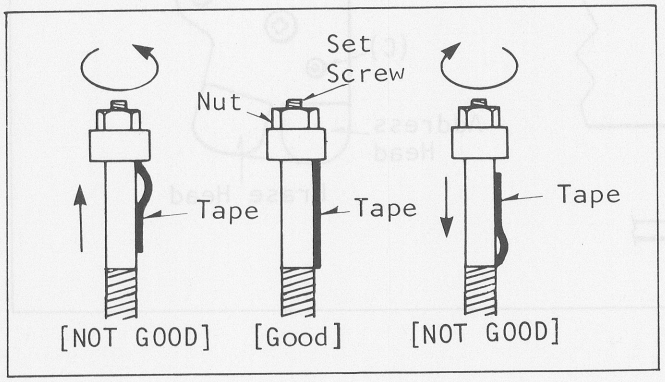


Fig. M18

5. When adjusting post P2 or P5, loosen the set screw, tighten or loosen the nut by using a box wrench or nut driver, hold the nut in position and retighten the set screw.

B. Tape Interchangeability Adjustment

1. Connect a scope probe to TP1 on the video playback P.C.B. (VEP0386B1), or the RF output on the rear panel.
2. Connect the EXT. TRG scope probe to TP4 on the Head Amp P.C.B. (VEP0539A).
3. Connect a TV monitor and playback the color bars portion of the alignment tape. Observe the RF envelope, which should be flat and even from end to end.

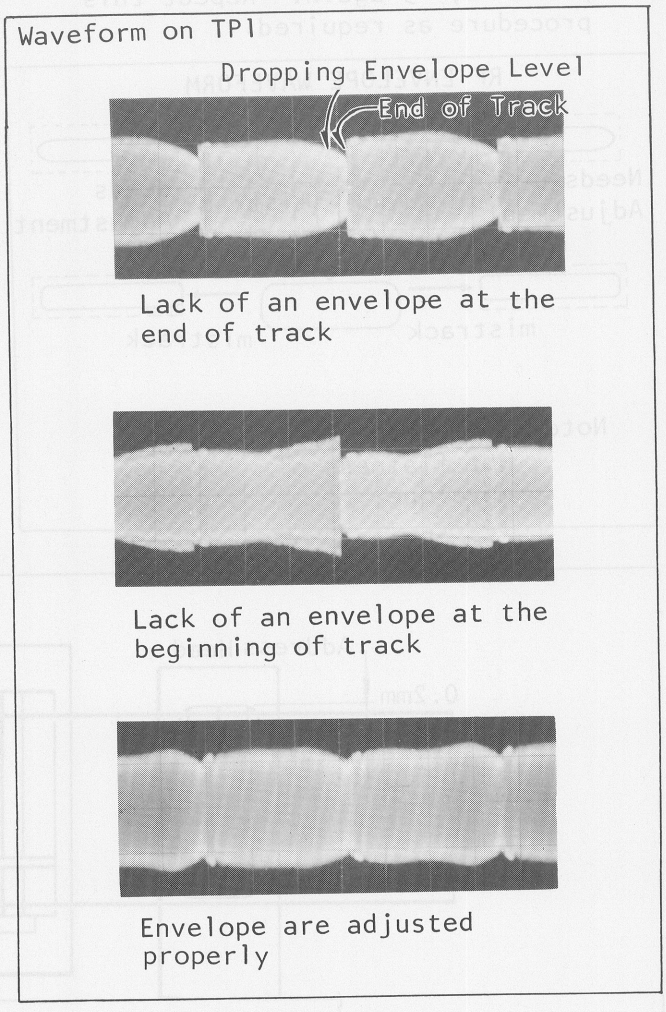


Fig. M19

4. To verify interchange, rotate the tracking control so that mistracking occurs and look at the scope signal. If there is an envelope level roll off at either end of a track, reset the tracking and adjust the height of limiter posts P2 and P5 to obtain as flat an envelope as possible. (See Fig. M19.)
5. If envelope appears to be adjusted properly, then turn the tracking control both left and right. This will cause the output to be reduced, but the flatness at the ends of the track should change only slightly.
6. If there is a large change of flatness at the end of the track, the limiter post height must be readjusted. Reset the tracking and readjust the height of limiter posts P2, P5 again. Repeat this procedure as required.

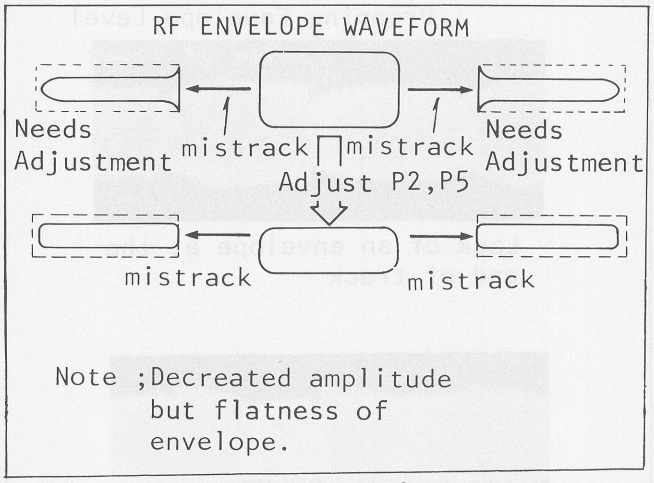


Fig. M20

C. Limiter Post (P3) Adjustment
1. After adjustment of posts P2 and P5, observe the P3 post.
2. Playback a cassette tape and adjust the P3 post height. The tape should just touch the top of the P3 post edges. The purpose is prevent tape wear.

D. Limiter Post (P4) Adjustment
1. After the adjustment of the P3 post, check the P4 post.
2. Playback a cassette tape and adjust the P4 post height. The tape should just contact the P4 post edges in order to stabilize the tape travel.

5 ADDRESS HEAD & ERASE HEAD HEIGHT ADJUSTMENT

* Equipment:
Hex Wrench (VFK76)
Alignment Tape (VFM2081D)
Phillips Screw Driver

1. Playback the Alignment Tape.
2. Adjust the 3 screws (A) (B) (C) evenly to raise or lower the head assembly so that the Address/Erase Head height is set as shown below.

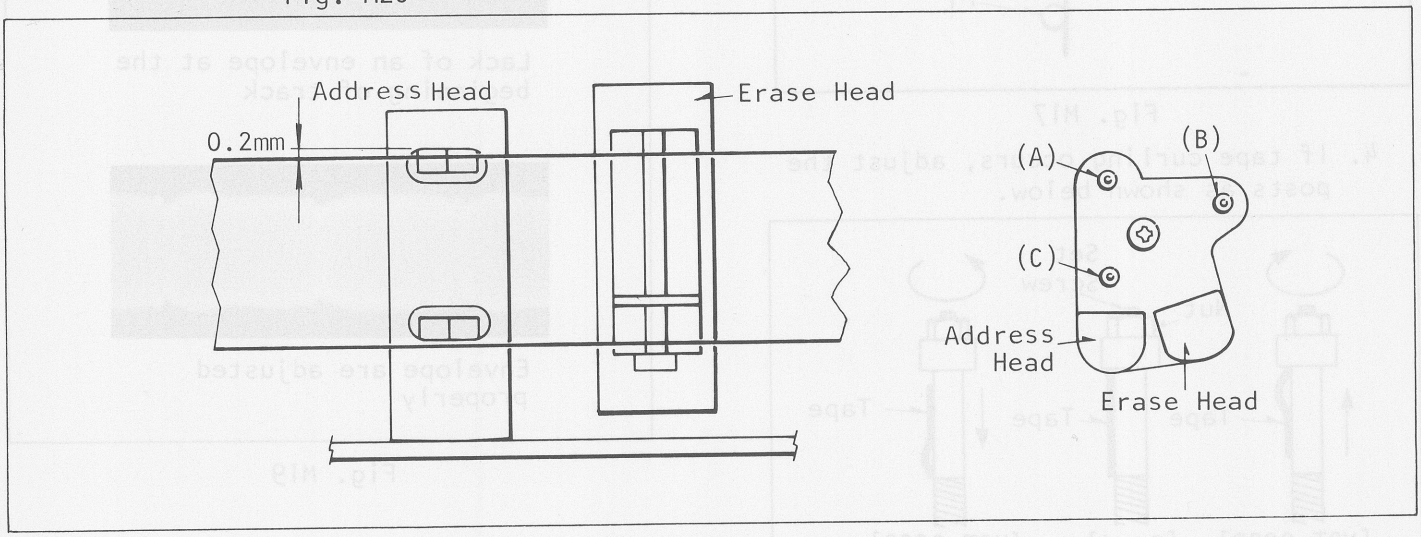


Fig. M21

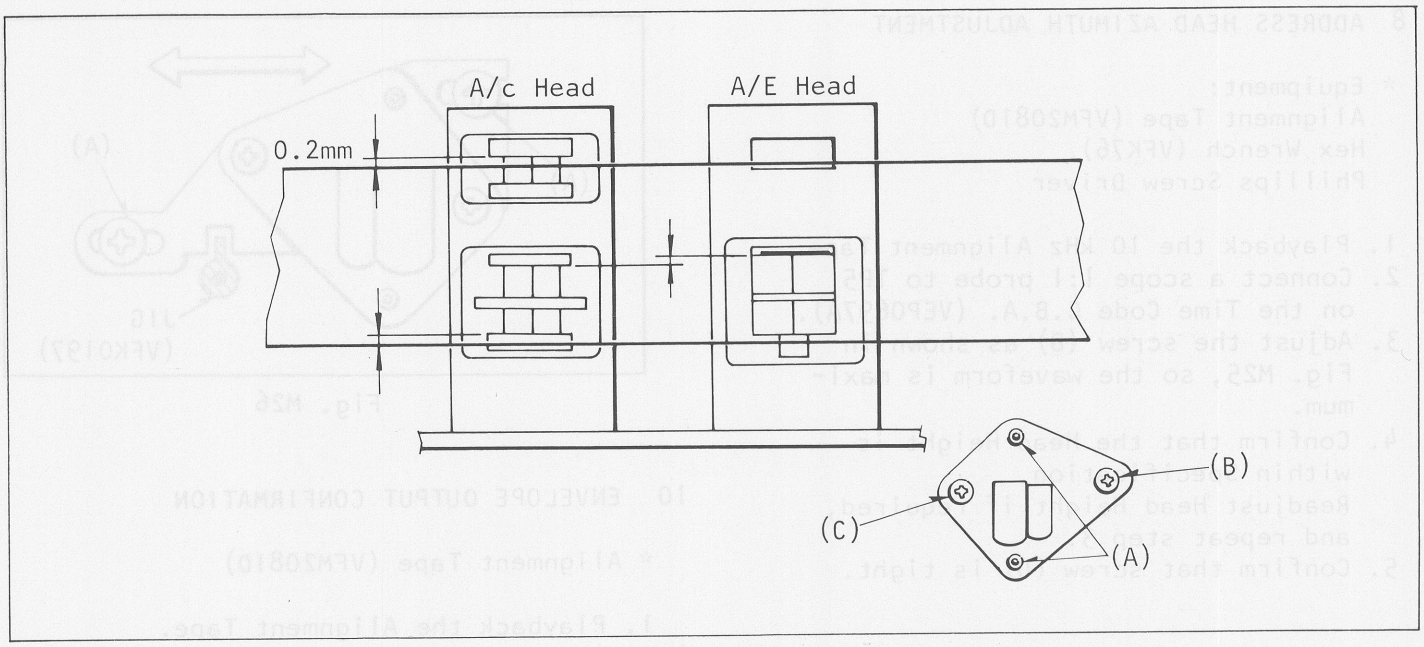


Fig. M22

6 AUDIO/CTL HEAD HEIGHT ADJUSTMENT

* Equipment:
  Hex Wrench (VFK76)
  Alignment Tape (VFM2081D)
  Phillips Screw Driver

1. Playback the Alignment Tape.
2. Adjust the 2 screws (A) and screw (B) and screw (C) to raise or lower the A/C Head to set the height as shown above.
   (See Fig. M22.)

7 AUDIO AZIMUTH ADJUSTMENT

* Equipment:
  Alignment Tape (VFM2081D)
  Hex Wrench (VFK76)
  Screw Driver

1. Playback the 10kHz audio portion of Alignment Tape (Monoscope Portion in VFM2081D).
2. Connect a scope CH1 to Audio CH1 (TP5 on the Audio Circuit Board) and CH2 to Audio CH2 (TP11 on the same board), and set the scope CHOP mode.
3. Adjust the screw (C) so that the waveforms have the same phase and maximum amplitude.
4. Transfer the scope to X-Y mode, and make sure that the lissajous' figure is the same as that shown in Fig. M24.

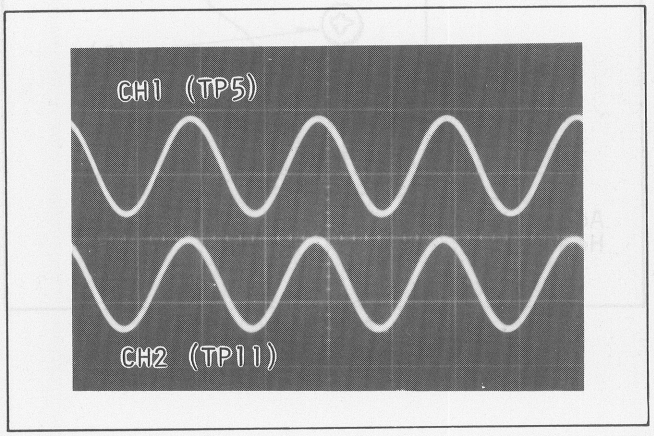


Fig. M23

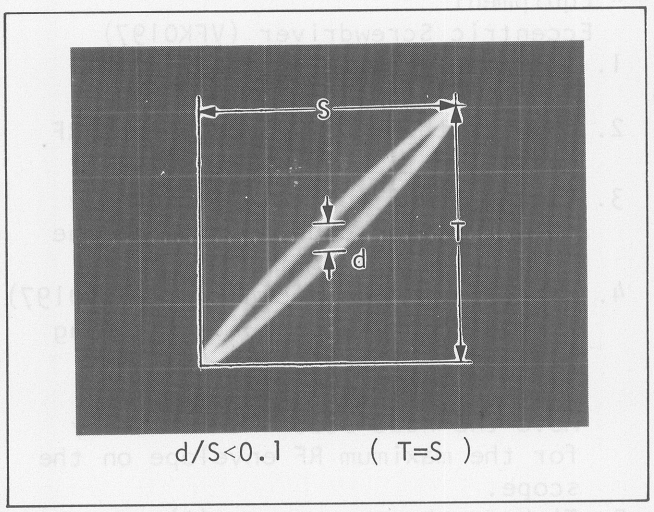


Fig. M24

8 ADDRESS HEAD AZIMUTH ADJUSTMENT

* Equipment:
  Alignment Tape (VFM2081D)
  Hex Wrench (VFK76)
  Phillips Screw Driver

1. Playback the 10 kHz Alignment Tape.
2. Connect a scope 1:1 probe to TP5 on the Time Code C.B.A. (VEP0697A).
3. Adjust the screw (B) as shown in Fig. M25, so the waveform is maximum.
4. Confirm that the Head Height is within Specification.
   Readjust Head Height if required, and repeat step 3.
5. Confirm that screw (D) is tight.

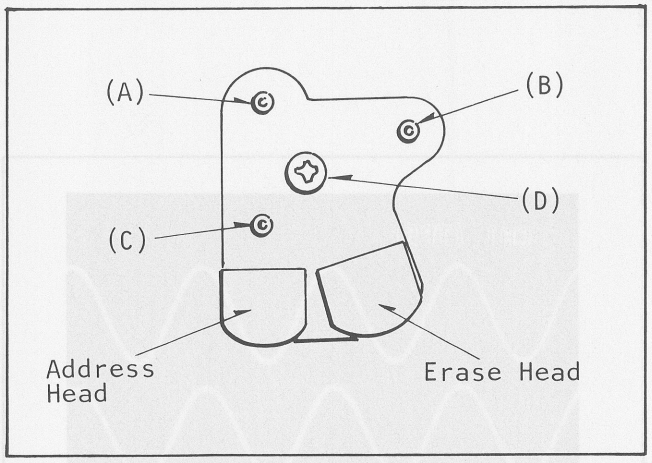


Fig. M25

9. AUDIO HEAD/CONTROL HEAD POSITION ADJUSTMENT

* Equipment
  Eccentric Screwdriver (VFK0197)

1. Set the tracking control to the Center (FIXED) Position.
2. Observe the RF envelope at the RF out put.
3. Loosen the 2 screws (A) and play back the monoscope portion of the alignment tape (VFM2081D).
4. Place the eccentric driver (VFK0197) in the chassis hole with the flag portion in the slot of the head mount as shown in Fig. M26.
   Move the head stack horizontally for the maximum RF envelope on the scope.
5. Tighten the two screws (A).

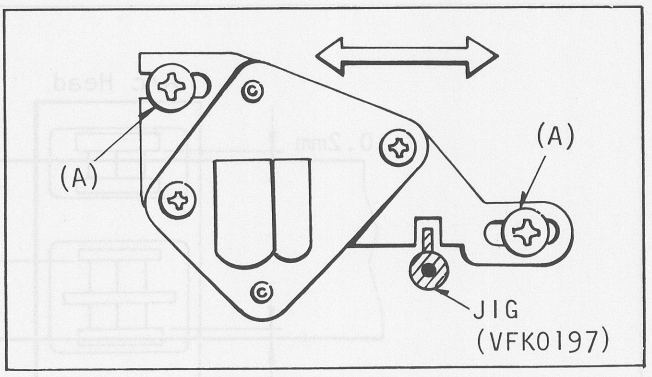


Fig. M26

10 ENVELOPE OUTPUT CONFIRMATION

* Alignment Tape (VFM2081D)

1. Playback the Alignment Tape.
2. Set the Tracking Control to the center (fixed) position.
3. Confirm that the envelope waveform ratios are as shown below.
   If the envelopes deviate substantially from this, redo the interchange adjustments starting on page 2-5.

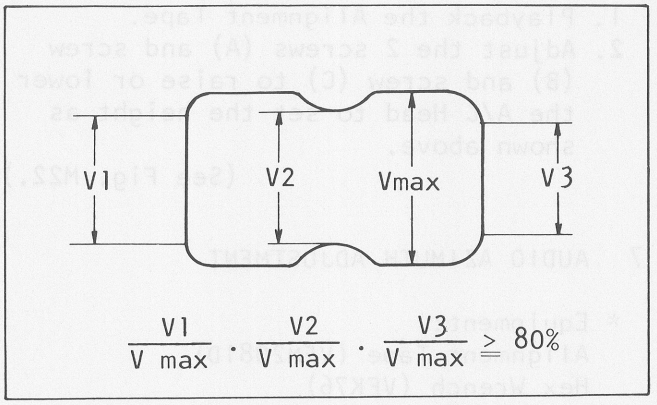


Fig. M27

4. Record monoscope signal (3.8 MHz) on a normal tape.
5. Playback the tape just recorded.
6. Check that the Tracking Control is still in the center position.
7. Confirm that the RF envelope waveform ratios are:

$$\frac{V1}{V\ max} \cdot \frac{V2}{V\ max} \cdot \frac{V3}{V\ max} \geqq 90\%$$

11 DIHEDRAL ADJUSTMENT (180 Degree Video Head)

* Equipment
Dihedral Adjustment Tool (VFK0183)
Alignment Tape (VFM2081D)

1. Dihedral adjustment is very seldom Required when replacing the video head disc unit. However, if the 180 degree separation of the heads is incorrect, the sort of distortion shown Fig. M28 will be seen on the monitor at the head switching point during playback. (Dihedral Error)

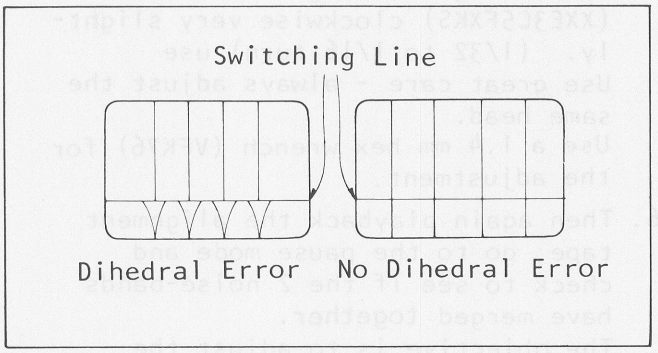


Fig. M28

2. In order to adjust the heads so that they are exactly 180 degrees part it is necessary to use the dihedral adjustment tool, VFK0183.
3. Place the dihedral adjustment tool in R1 or W1 (see Fig. M29) of the video head Red and White (R & W) serve as reference designation only. Mark the drum so that only one head will be moved.
IMPORTANT: Make sure that one head and one head only is adjusted for 180°. Remember (or mark) which head is being adjusted and always make adjustments on this head.
4. Turn the dihedral adjustment tool until the tapered portion contacts the head base and mechanical resistance is felt.
5. Turn the tool an additional 1/64 turn.
6. After removing the tool, playback the recorded alignment tape (VFM2081D) and check for dihedral distortion at the switching points. Roll the vertical hold if required, or use a cross pulse monitor.
7. If the situation has improved, stop the tape and advance the tool another 1/64 turn as in steps (4), (5) and (6) until all dihedral error is removed.
8. If the situation got worse in step (6), use the tool on the opposite side of the same video head. Advance the driver in very small increments (less than 1/32 turn) and check the playback between each step for diminishing dihedral error.
Continue this procedure until no error is apparent.

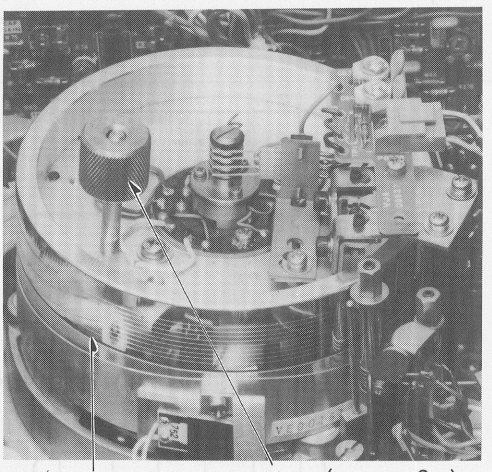


Fig. M29

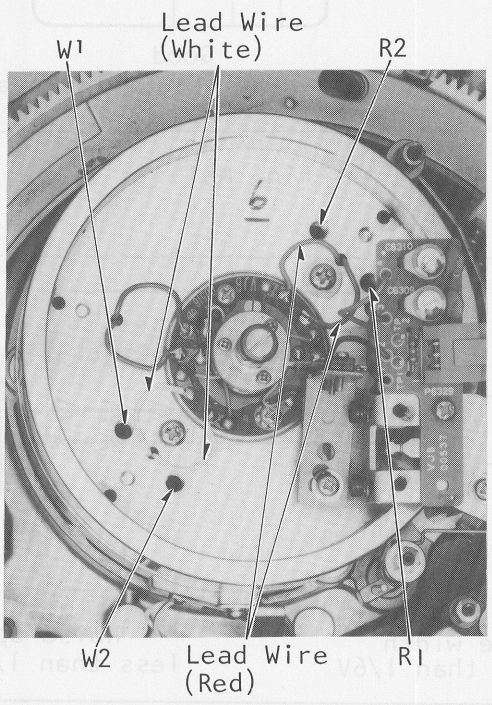


Fig. M30

12 VIDEO HEAD HEIGHT ADJUSTMENT

Note: Height adjustments are critical.
Do not turn the height screw more than 1/16 turn at a time.
If the height screw is turned in too far, head damage might occur.
Adjust only one head.
It is not adviseable to adjust both heads for a change of height since machine interchangeability might be affected.
Normally the head height of new or existing heads does not need to be adjusted.
In order to see if a problem exists:

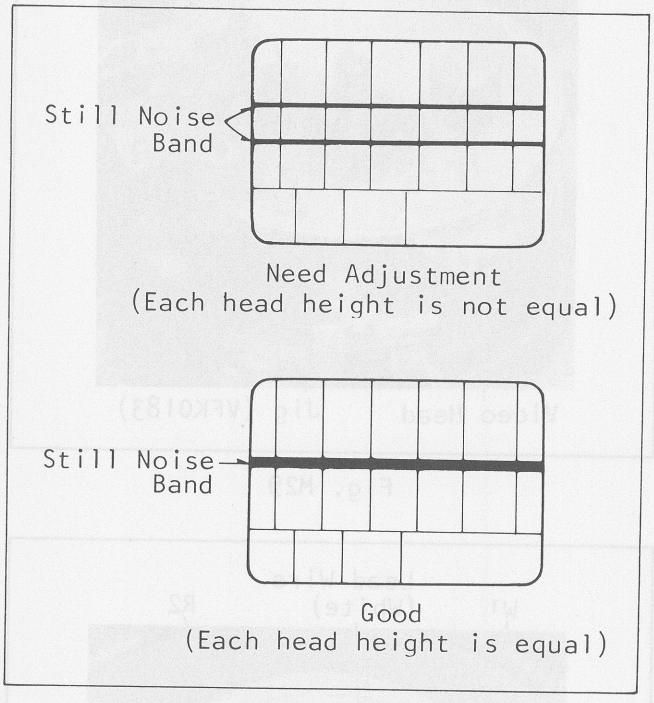


Fig. M31

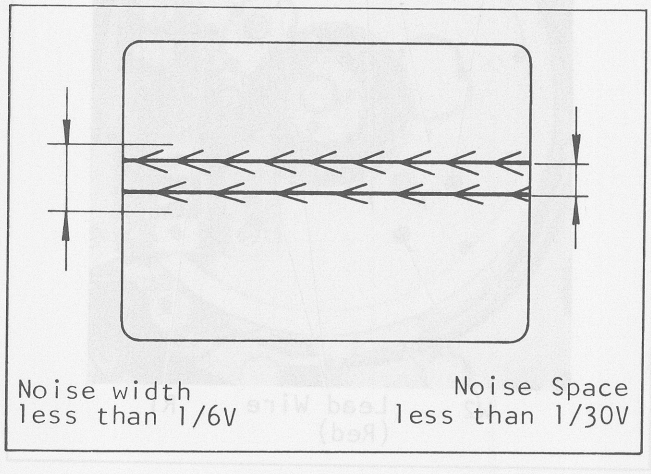


Fig. M32

1. Playback the alignment tape (VFM 2081D) at the color-bar section.
2. Place the unit in pause mode, and adjust the pause button until the noise band is visible in the picture.
3. If the video heads do not have the same relative height, 2 distinct noise-bands will appear.
   If the height is proper, only one noise bar will appear.
   If there is a height problem, adjust as follows:
4. Place the unit in the stop mode.
5. After the heads come to a stop, adjust the height of just one head by turning the height hex screw (XXE3C5FXKS) clockwise very slightly. (1/32 to 1/16 turn) use
   Use great care - always adjust the same head.
   Use a 1.4 mm hex wrench (VFK76) for the adjustment.
6. Then again playback the alignment tape, go to the pause mode and check to see if the 2 noise-bands have merged together.
   The objective is to adjust the head height so the just one noise band is visible.
   If the adjustment was not enough, or if it has further separated the noise-bands, stop the unit and adjust the same head height hex screw either clockwise or counter-clockwise as necessary until the adjustment is correct.

13-1 HOLD LEVER ADJUSTMENT

Adjustment Procedure:
* Specification: L = 1.0 ± 0.3 mm
* Equipment Required
  Fine Adjustment Screwdriver (VFK0136)

1. Disassemble the unit, including removal of the cassette compartment base. Defeat the safety switch. Insert a cassette to activate the switches, and cover the photo-transistors with opaque tape.

2. Turn the power on and push the Play button.
3. Turn the power off.
4. Loosen screw (A) and insert the fine adjustment driver into the hole (B).
5. By turning the adjustment driver, set space "L" to be 1.0 ± 0.3mm.
6. Tighten the screw (A).

13-2 CONFIRMATION OF T.B OFF LEVER

Clearance

* Specification: C = more than 0.1 mm

When the Hold Lever adjustment is performed, the T.B Off Lever clearance should be checked.

1. Turn the power on and push the F.F or REW Button so that Sub-Loading is performed.
2. Turn power OFF.
3. Turn the take up reel table clockwise by hand.
4. Measure the length of the gap "C". It should be more than 0.1 mm.

13-3 CONFIRMATION OF THE LOADING BRAKE LEVER LENGTH

* Specification: t ≧ 1.5 mm

When the Hold Lever adjustment is performed, the Loading Brake Lever Length should be checked.

1. Turn the power on and push the F.F or REW button so that Sub-Loading is performed.
2. Turn the power off.
3. Measure the length of gap "t". It should be more than 1.5 mm.

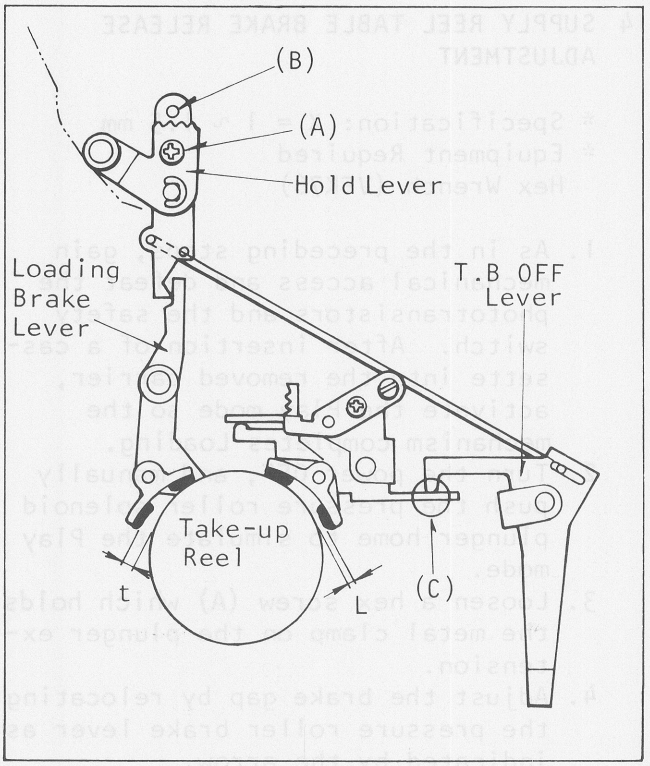


Fig. M33

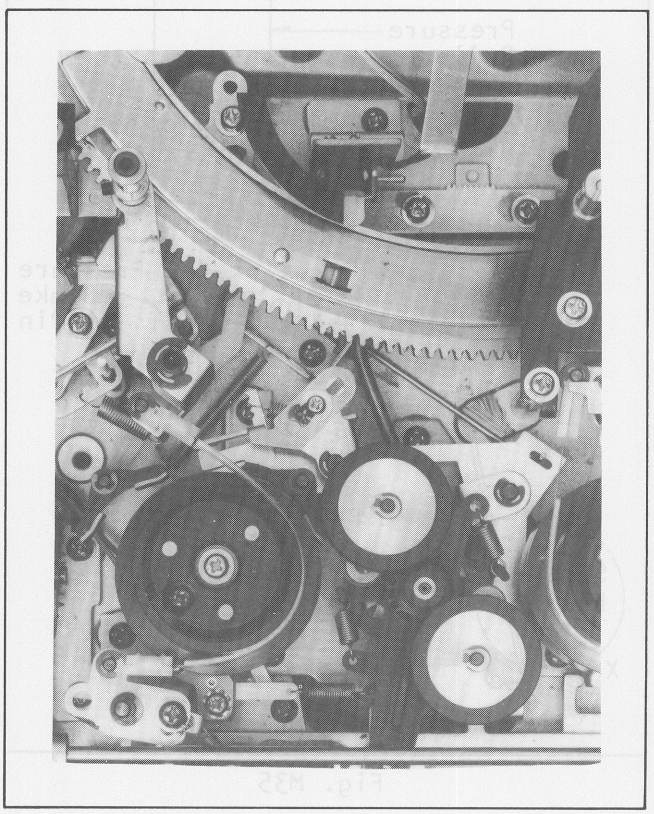


Fig. M34

14 SUPPLY REEL TABLE BRAKE RELEASE ADJUSTMENT

* Specification: X = 1 ∿ 1.5 mm
* Equipment Required
  Hex Wrench (VFK76)

1. As in the preceding steps, gain mechanical access and defeat the phototransistors and the safety switch. After insertion of a cassette into the removed carrier, activate the Play mode so the mechanism completes Loading.
2. Turn the power OFF, and manually push the pressure roller solenoid plunger home to simulate the Play mode.
3. Loosen a hex screw (A) which holds the metal clamp on the plunger extension.
4. Adjust the brake gap by relocating the pressure roller brake lever as indicated by the arrow.
   Dimension X should be 1 ∿ 1.5 mm.
   Release the solenoid.

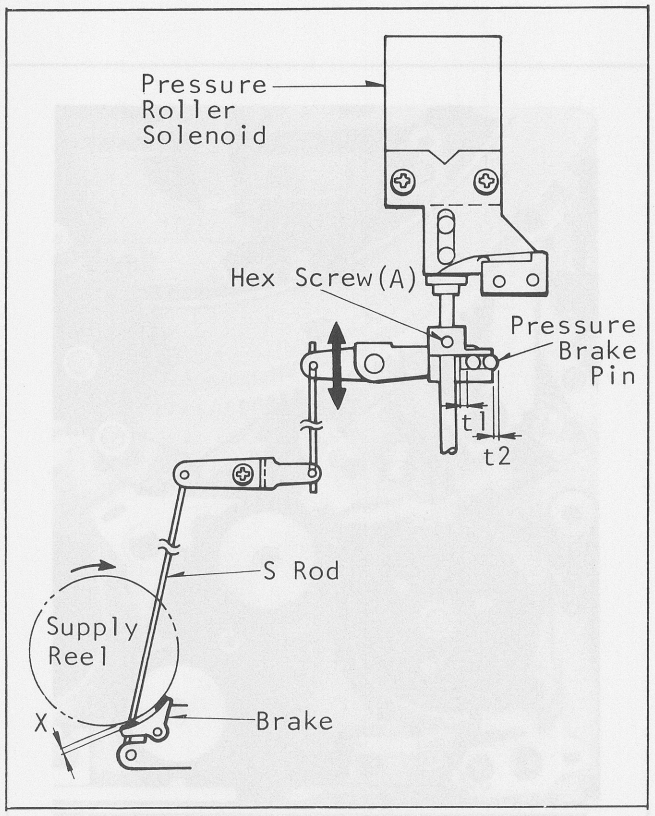


Fig. M35

* Brake Lever Pin Confirmation
  After this adjustment, confirmation of the seating of the brake lever pin is needed.
  Specification: $t_1 \geqq 0.5$ mm
  $t_2 \leqq 0.5$ mm

1. With the solenoid plunger released as in the stop mode, measure the t_1 space (see Fig. M35).
2. With the solenoid plunger pushed in, as in the play mode (Review step 1 to 2) measure the t_2 space (see Fig. M35).
   If the specification of $t_1 \geqq 0.5$ mm and $t_2 \leqq 0.5$ mm is not met, the bracket adjusted in step 4 may need to be rotated.
3. When in the stop mode, the pressure roller solenoid pin should contact the pressure roller guide.
4. When in the stop mode, turn the supply reel table clockwise by hand. The supply rod should be loosen.

15 RING STOP ADJUSTMENT

* Specification:
  Play mode: m, $n \geqq 0$
  t_1 gap should be 0 mm
  t_2 gap $\pm$ 0.2$\pm$0.1mm
* Equipment Required
  Phillips Screw Driver

1. As in the preceding steps, gain mechanical access and defeat the phototransistors and the safety switch. After insertion of a cassette into the removed carrier, activate the Play mode so the mechanism completes Loading and then remove A.C. power.
2. Examine the black plastic and the metal arm upon which the pressure roller is mounted. As is shown in the exploded view in Fig. M36, there are matching notches in both the plastic and the metal. When the initial position up of the ring is complete, the notches will line up after the pressure roller has been seated by the pressure roller solenoid.

3. Loosen the screws (B) and (C) and adjust the position by displacing ring stopper in the directions indicated by arrow. Move the entire loading ring until the pressure roller guide and pressure roller arm notches align as shown (m, n $\geq$ 0).
4. Move the lower ring and the ring stop (D) until snug, and confirm that no gap exists.
5. Tighten the screws (B).
6. Loosen the screws (C) (if not already done) and adjust the position of ring stop A in the directions indicated by arrow until gap exists at t_2.
7. Tighten the screws (C).

Note: Up and down gap of the lower ring (f) must be 0 mm. See the next step.

16 VERTICAL RING SUPPORT ADJUSTMENT

* Specification:
  gap = 0
  Force = 250 ∿ 650 g
* Equipment Reguired:
  Tension Gauge (VFK3) (1000 g)

1. As in the preceding steps, gain mechanical access and defeat the phototransistors and the safety switch. After insertion of a cassette into the removed carrier, activate the Play mode so the mechanism completes Loading and then remove A.C. power.
2. Not only should no gap exist, but a distinct downward tension should exist at the junction of ring stop D and the lower ring (f) support.
3. Slide the ring in and out of contact with the ring stopper. It should seat firmly.
4. Connect the tension gauge to the loading ring pin (See Fig. M36).
5. Measure the force required to rotate away the ring support.
6. If out of specification, adjust by loosening screw (F) and repositioning the stop.

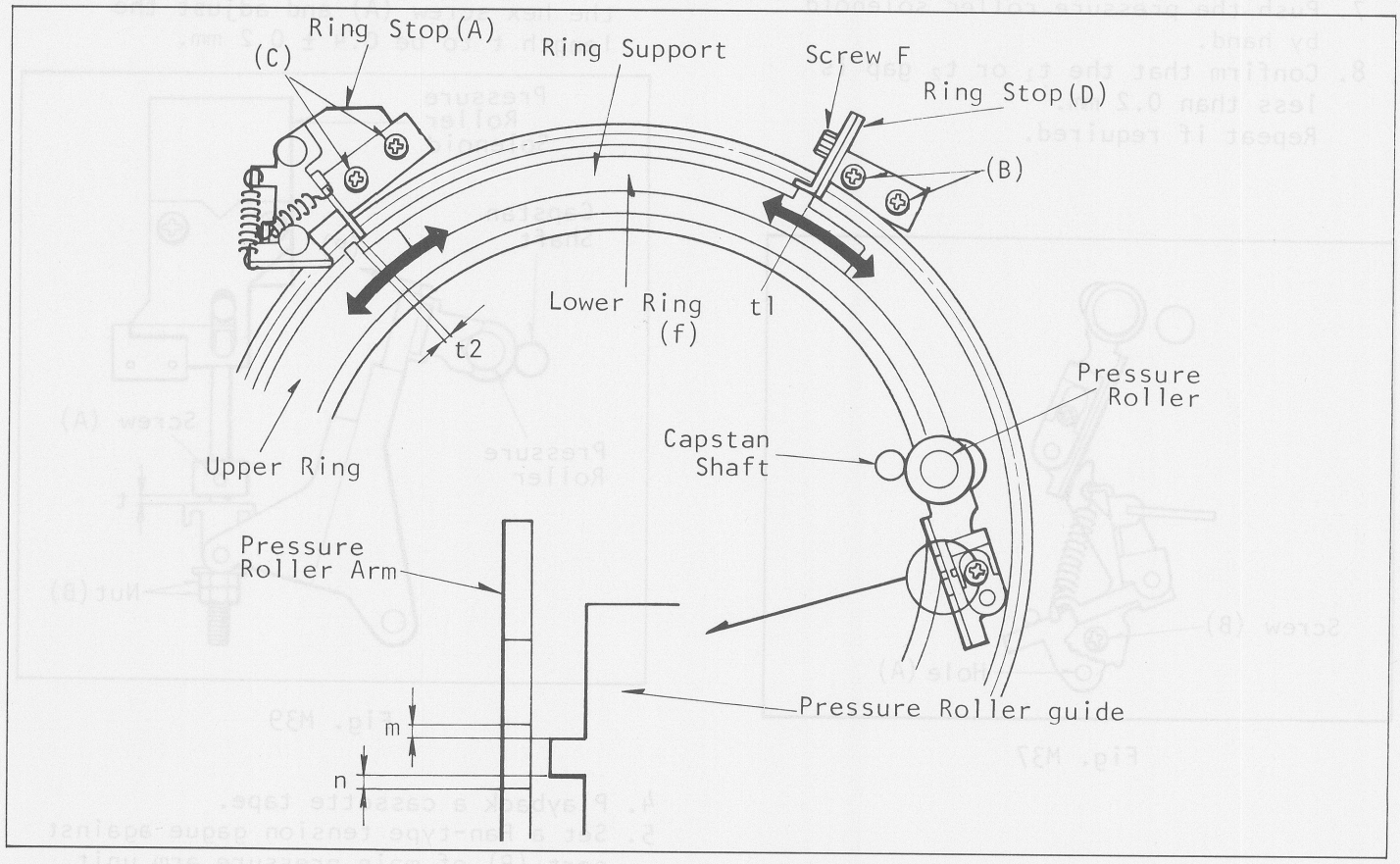


Fig. M36

17 COMPENSATION LEVER ADJUSTMENT

* Specification:
  t_1/t_2 = 0.5 ∿ 1 mm
* Equipment Required:
  Fine Adjustment Driver (VFK0136)

This adjustment sets the resting point of the pressure roller in Pause.

1. Remove the top panel if required. (Refer to section "DISASSEMBLY METHOD" Item 2).
2. Insert a cassette in and push the Play button.
3. Pause the tape and turn the power OFF.
4. Loosen the screw (B) and use the fine adjustment screwdriver at Hole (A). Adjust the position of the pressure roller so that t_1/t_2 = 0.5 ∿ 1 mm. Retighten screw (B).
   Be sure that the tape does not creep.
5. After adjustment confirmation is required. Turn the power on and remove the cassette.
6. Return to play/pause mode and turn the power OFF.
7. Push the pressure roller solenoid by hand.
8. Confirm that the t_1 or t_2 gap is less than 0.2 mm.
   Repeat if required.

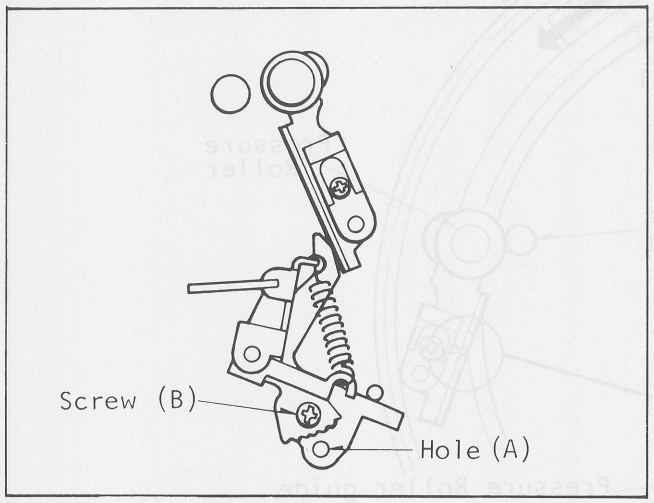


Fig. M37

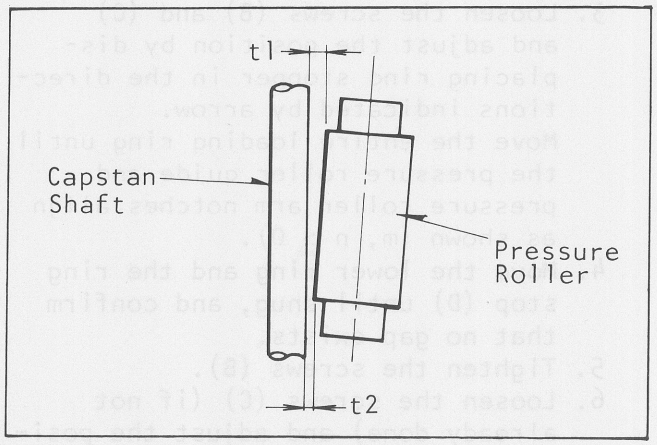


Fig. M38

18 PRESSURE ROLLER FORCE ADJUSTMENT

* Specification:
  Pressure Roller Force: 2.2 ± 0.2 kg
  Dimension t = 0.4 ± 0.2 mm
* Equipment Required:
  Fan-type tension gauge (VFK66)
  Hex Wrench (VFK76)

1. Remove the top panel. (Refer to section "DISASSEMBLY METHOD Item 2).
2. Insert a cassette and begin play.
3. After loading is performed, loosen the hex screw (A) and adjust the length t to be 0.4 ± 0.2 mm.

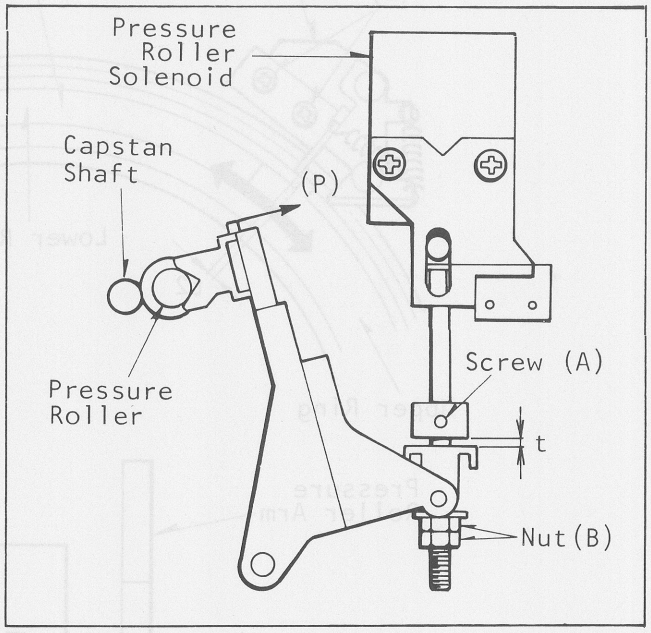


Fig. M39

4. Playback a cassette tape.
5. Set a Fan-type tension gague against part (P) of main pressure arm unit.

6. Push against the lever with gague, in the direction indicated by the arrow.
7. Confirm that the tension gauge reading is 1.9 ± 0.2 kg at the moment tape stops.
8. If adjustment is required, adjust the (B) nuts which form a locking pair. Undo the pair and adjust, then retighten. Confirm that the adjustment is proper.

19 BRAKE ADJUSTMENT

* Specification
  Brake Force
  A: 500 ∿ 750 g.cm (Counter-clock wise)
  B: 60 ∿ 90 g.cm (Clockwise)
  Dimension t1,t2 = 0.2 ∿ 0.5 mm

* Equipment Required:
  Eccentric Driver (VFK0192)
  Dial torque Gauge (VFK0133)
  Adopter (VFK68)

1. As in the preceding steps, gain mechanical access and defeat the phototransistors and the safety switch. After insertion of a cassette into the removed carrier, activate the Rewind mode so the mechanism completes Sub-Loading and then remove A.C power.
2. Loosen Screw (C).
3. Turn the take-up table clockwise by hand.
4. Place the eccentric driver in hole (D) and adjust the t1 gap to be 0.2 to 0.5 mm.
5. Retighten screw (C).
6. Loosen screw (E).
7. Turn the supply reel table clockwise by hand.
8. Place the eccentric driver in hole (F) and adjust the t2 gap to be 0.2 to 0.5 mm.
9. Retighten screw (E).
10. Utilize a dial type torque gauge with an adopter to fit the pins of the take-up reel table.
11. Rotate the gauge counter clockwise, and measure "Force B".
12. If this Force B does not fall between 60 ∿ 90 g.cm, change the spring position. Select the proper notch at "X" to get 60 ∿ 90 g.cm.
13. Next, rotate the gauge clockwise, and measure "Force A".
14. If this Force does not fall between 500 ∿ 750 g.cm, readjust the spring position (notch X) as in step 12.
15. Turn on the AC power, and place the unit in Eject so that unloading is completed.
16. Place the torque gauge on the Supply Reel Table, and measure and adjust force A and B according to above steps (11 ∿ 14). If adjustment is required, move the spring at notch "Y".

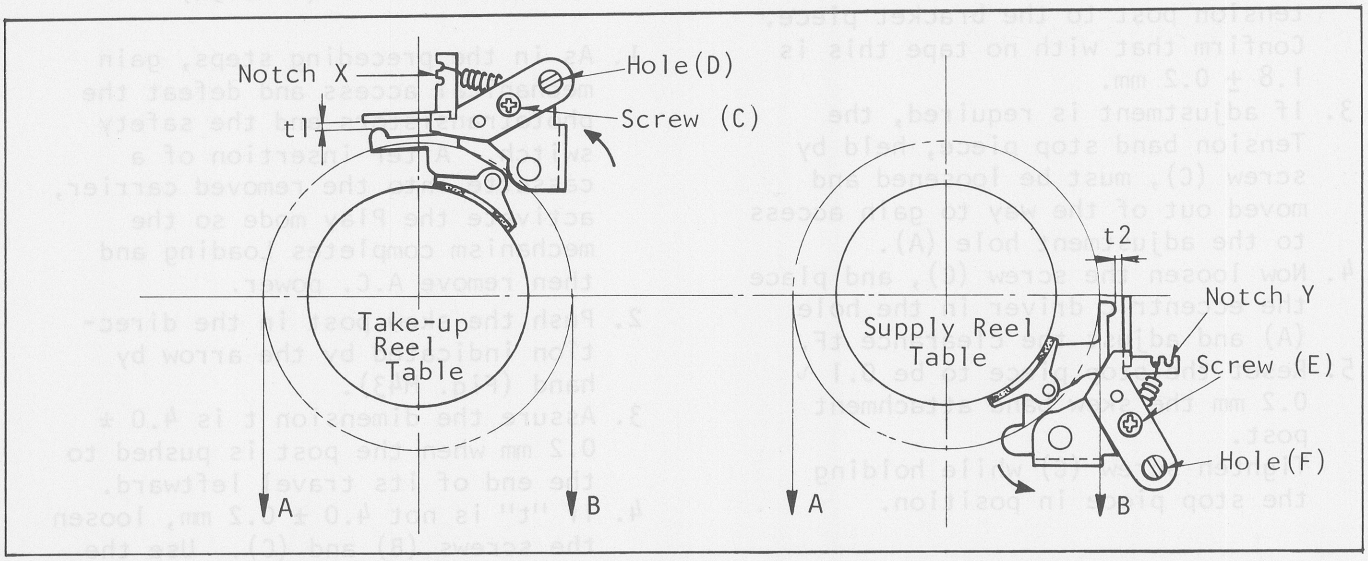


Fig. M40

20 SKEW BAND LENGTH ADJUSTMENT

* Specification:
  tF = 1.8 ± 0.2 mm
* Equipment Required:
  Eccentric Driver (VFK0192)

1. As in the preceding steps, gain mechanical access and defeat the phototransistors and the safety switch. After insertion of a cassette into the removed carrier, activate the Play mode so the mechanism completes Loading and then remove A.C. power.

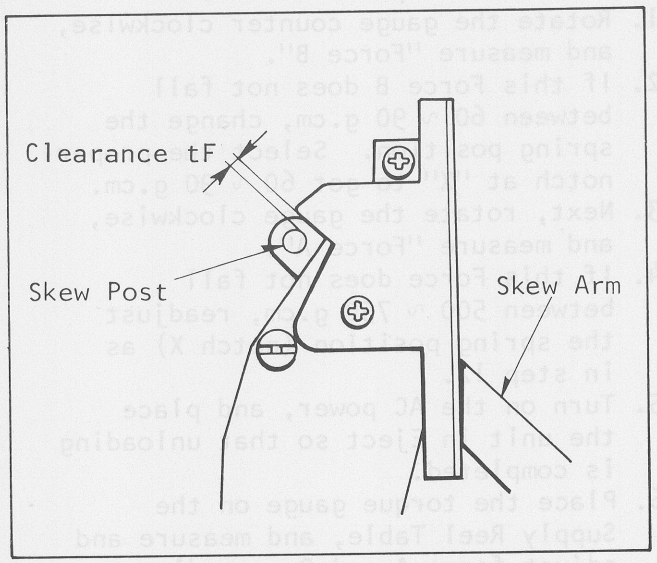


Fig. M41

2. Observe the distance "tF" from the tension post to the bracket piece. Confirm that with no tape this is 1.8 ± 0.2 mm.
3. If adjustment is required, the Tension band stop piece, held by screw (C), must be loosened and moved out of the way to gain access to the adjustment hole (A).
4. Now loosen the screw (C), and place the eccentric driver in the hole (A) and adjust the clearance tF.
5. Reset the stop piece to be 0.1 ∿ 0.2 mm the skew band attachment post.
   Tighten screw (C) while holding the stop piece in position.

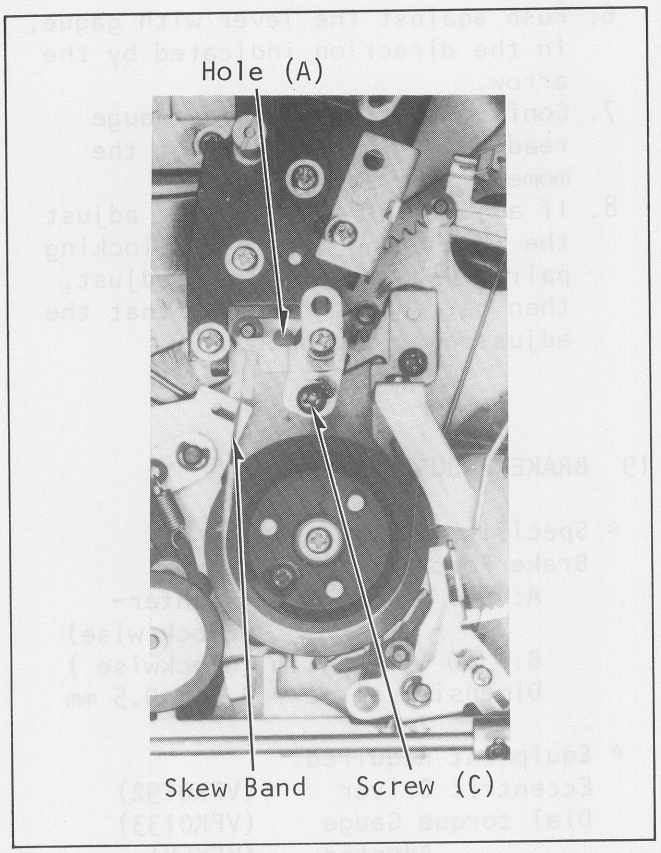


Fig. M42

21 SKEW COUPLER LINK ADJUSTMENT

* Specification
  t = 4 ± 0.2 mm
  S = 0.1 ± 0.05 mm
  $\ell \geqq 0.3$ mm
* Equipment Required
  Eccentric driver (VFK0192)

1. As in the preceding steps, gain mechanical access and defeat the phototransistors and the safety switch. After insertion of a cassette into the removed carrier, activate the Play mode so the mechanism completes Loading and then remove A.C. power.
2. Push the skew post in the direction indicated by the arrow by hand (Fig. M43).
3. Assure the dimension t is 4.0 ± 0.2 mm when the post is pushed to the end of its travel leftward.
4. If "t" is not 4.0 ± 0.2 mm, loosen the screws (B) and (C). Use the eccentric driver in the Hole (A) to adjust the t clearance.

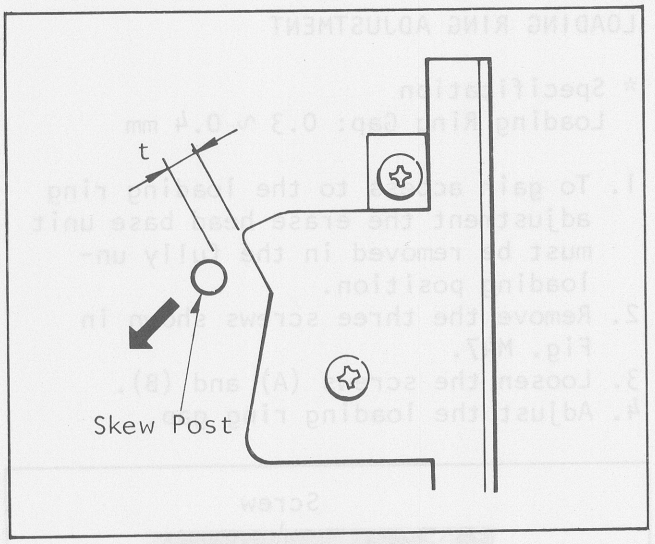


Fig. M43

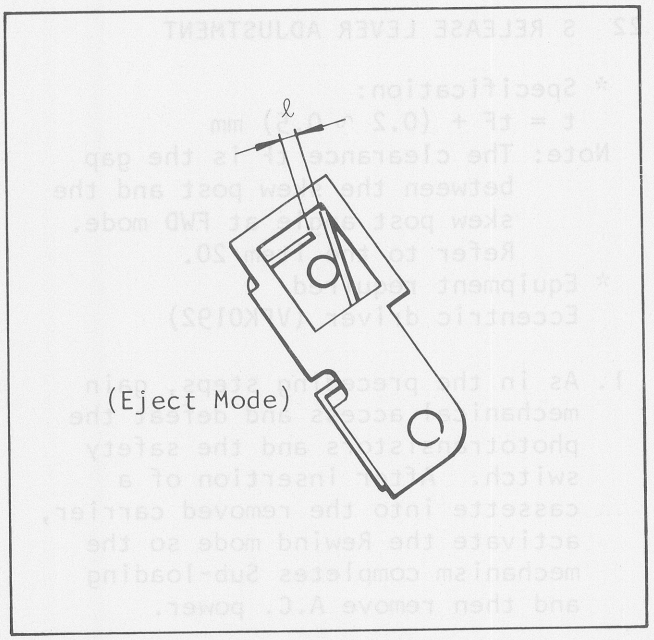


Fig. M44

5. Tighten the screws (B) and (C).
6. After these adjustments loosen screws (D) and (E), and place a 0.1 mm gauge at "S".
7. Push the S Link Stopper in the direction indicated by the arrow.
8. Tighten screws (D) and (E).
9. Remove the spacer gauge.
10. Turn on the power and confirm the clearance "ℓ" in the Eject Mode.

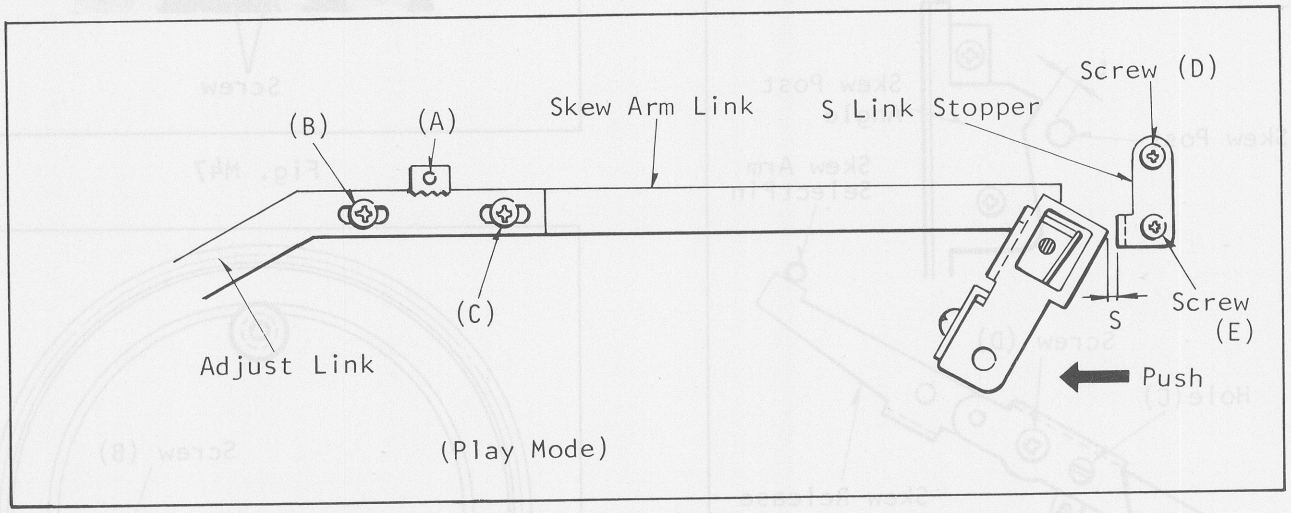


Fig. M45

22 S RELEASE LEVER ADJUSTMENT

* Specification:
  t = tF + (0.2 ∿ 0.5) mm
Note: The clearance tF is the gap between the skew post and the skew post angle at FWD mode. Refer to the item 20.
* Equipment required
  Eccentric driver (VFK0192)

1. As in the preceding steps, gain mechanical access and defeat the phototransistors and the safety switch. After insertion of a cassette into the removed carrier, activate the Rewind mode so the mechanism completes Sub-loading and then remove A.C. power.
2. Loosen the screw (D) and set the Eccentric driver to the Hole (C).
3. Adjust the clearance t to be tF + (0.2 ∿ 0.5) mm.
4. Tighten the screw (D).
5. Confirm that at (A) position and (B) position firm contact is made, and the clearance t must be larger than the clearance tF.

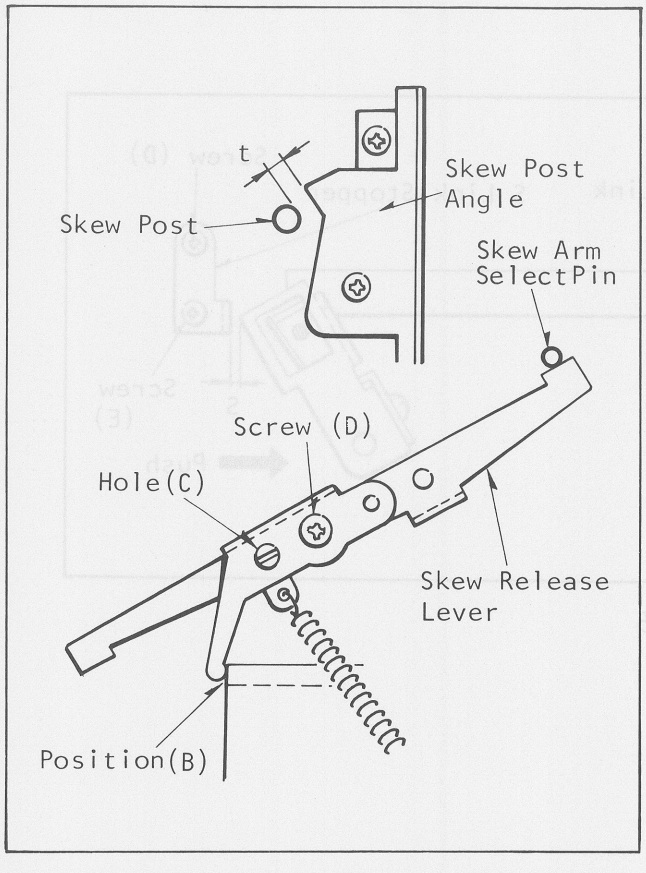


Fig. M46

23 LOADING RING ADJUSTMENT

* Specification
  Loading Ring Gap: 0.3 ∿ 0.4 mm

1. To gain access to the loading ring adjustment the erase head base unit must be removed in the fully unloading position.
2. Remove the three screws shown in Fig. M47.
3. Loosen the screws (A) and (B).
4. Adjust the loading ring gap.

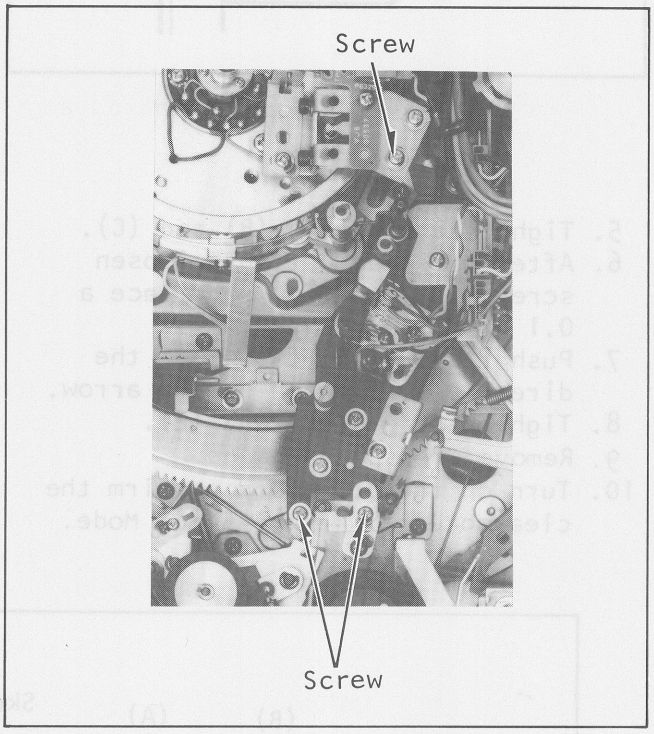


Fig. M47

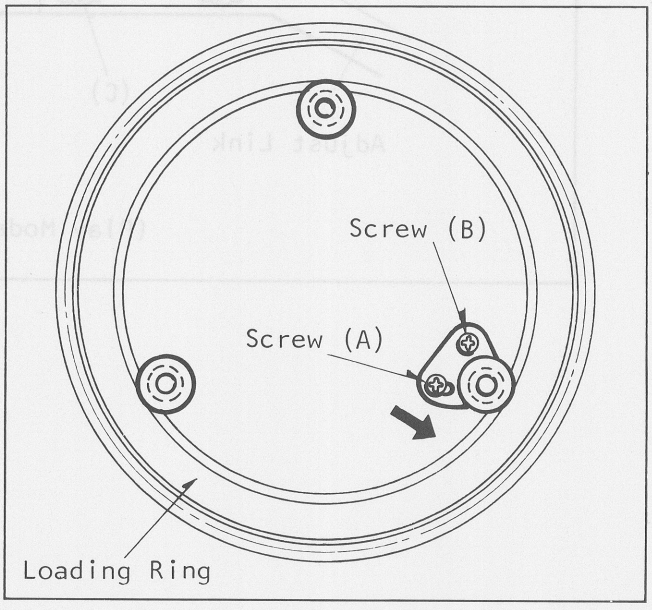


Fig. M48

24 LOADING BRAKE ADJUSTMENT

* Specification
  1. Loading Brake Force
     135 ± 15 gcm (Clockwise)
  2. Brake and Reel Table Gap
     $t \geqq 1.5$ mm
* Test Equipment
  Dial Torque Gauge (VFK0133)
  Adaptor (VFK68)

A. Measurement Procedure

1. Attach the adaptor to torque gauge.
2. Place the torque gauge on the Reel Table in STOP mode.
3. Rotate the gauge slowly in the each direction and take the reading at the moment when the Reel Table begins slipping.

B. Adjustment Procedure
1. For adjustment of Braking force A change the spring position, selecting the proper notch.
2. After adjustment, confirm the "t" gap in the play mode.

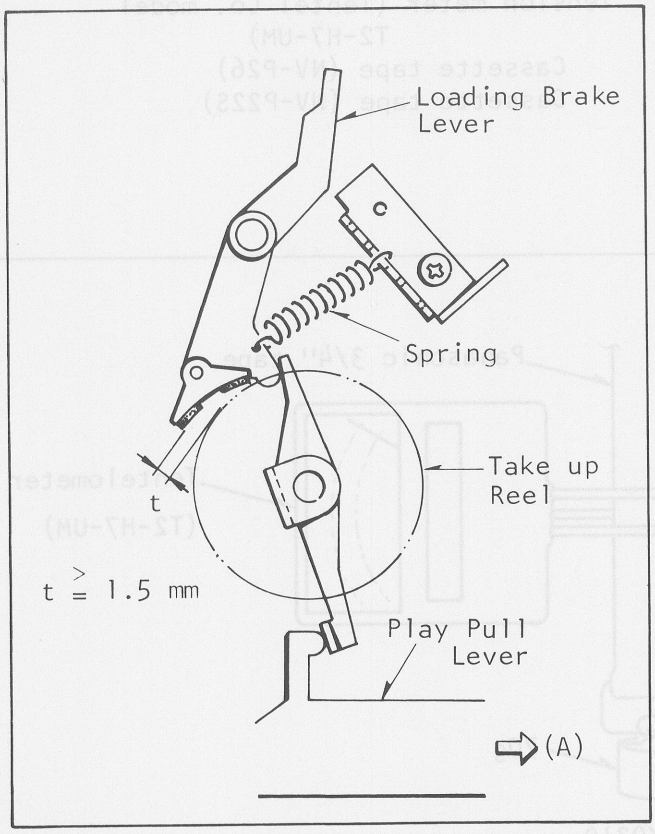


Fig. M49

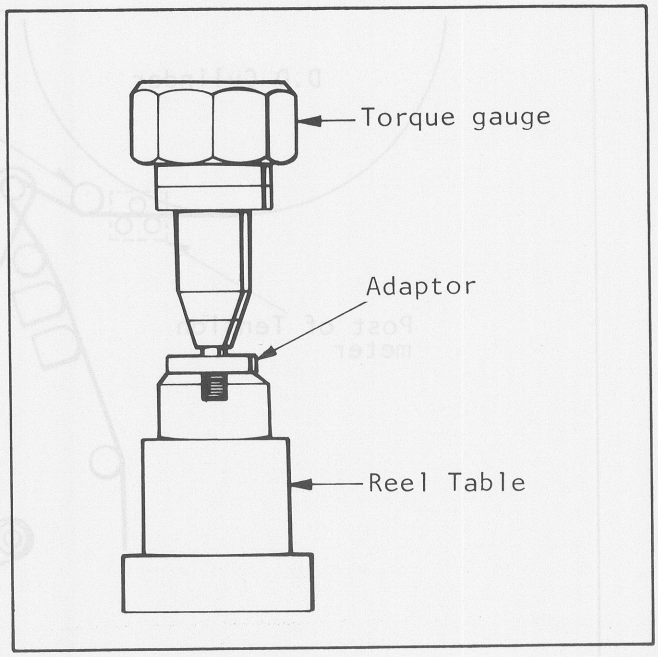


Fig. M50

25 MEASUREMENT AND ADJUSTMENT OF BACK-TENSION

* Specification: 70 ± 3 g (Beginning of the Tape play mode)
* Equipment
  Tension Meter (Tentel Co. model T2-H7-UM)
  3/4" Cassette Tape (NV-P26)

A. Measurement Procedure
1. Playback a cassette tape and wait until the tape movement has stabilized.
2. Check that the Skew control has run to its center position.
3. Insert the tension meter between Limiter post (P3) and DD cylinder. Read the meter at its null (Minimum) position.

Note: When measuring, make sure that the three posts of the meter are all in good contact with the tape. By getting the meter exactly vertical and parrallel to the tape path, a minimum reading will be displayed.

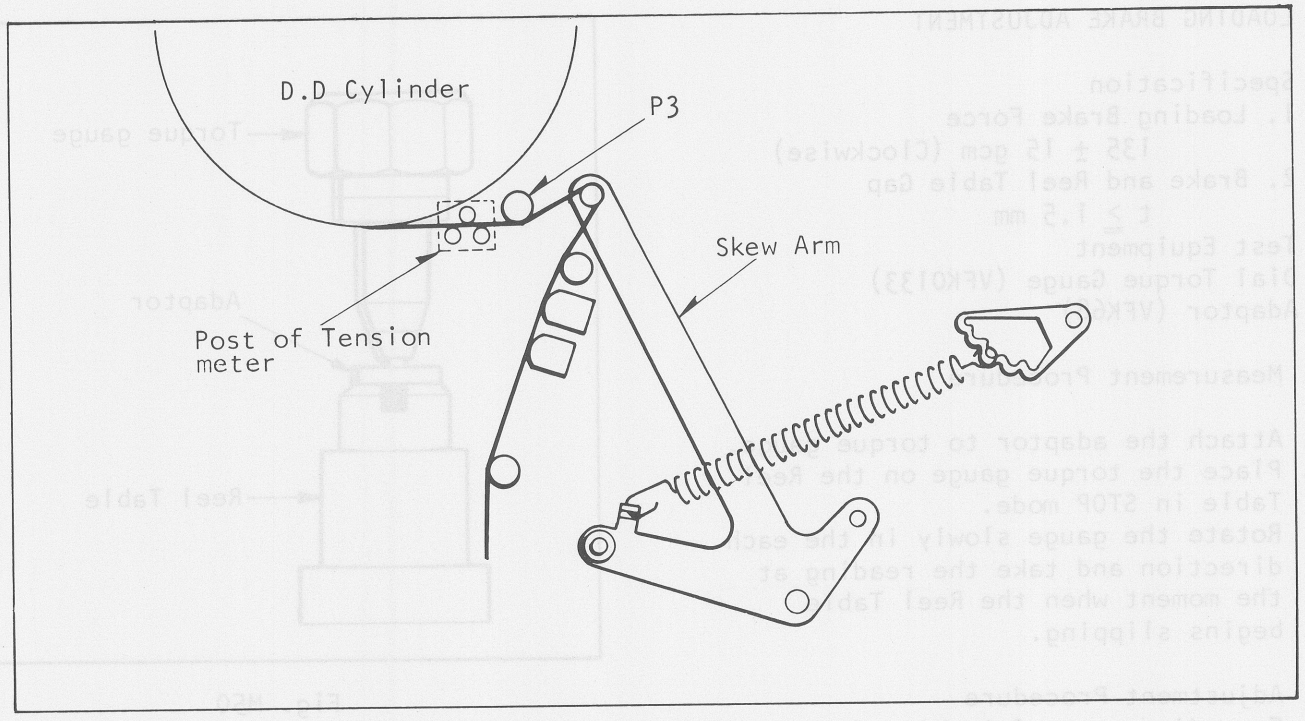


Fig. M51

B. Adjustment Procedure

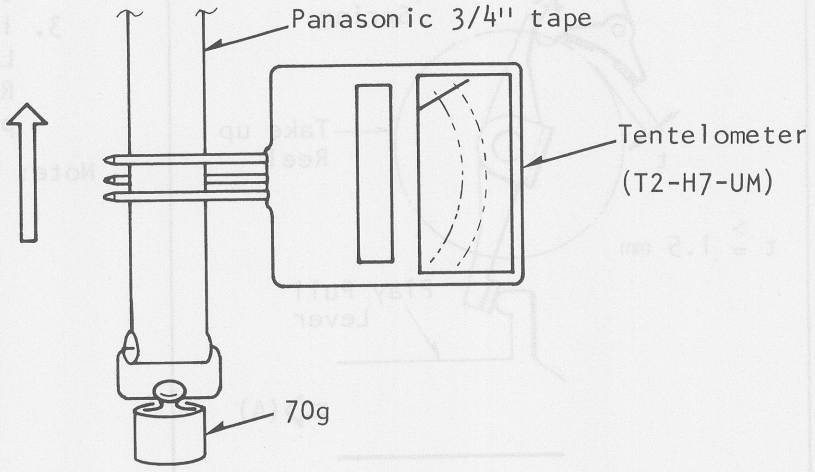
1. To adjust back tension, change the skew spring posiiton, selecting the proper notch.
2. Confirm that the back tension is 45 ∿ 53 g at the skew cam minimum.
3. Confirm that the back tension is 87 ∿ 95 g at the skew cam maximum.
4. If this cannot be acheived, check the brake band and its length adjustment.

26 MEASUREMENT AND ADJUSTMENT OF TAKE-UP TENSION

* Specification: 30 ∿ 60 g (use NV-P26)
* Equipment:
  Tension meter (Tentel Co. model T2-H7-UM)
  Cassette tape (NV-P26)
  Cassette tape (NV-P22S)

Adjustment of Tension Meter

Check the tension meter before measuring tape tension.
When PANASONIC 3/4" tape atached to a 70 gram plumb bob is pulled through the posts approximately at a normai tape speed so that the meter needle should point to 70 gram.
NV-9600/NV-9240/AU-700 tape tension is to be measured by Tension Meter Model T2-H7-UM.



VFK0210

A. Measurement procedure

1. Connect the Editing controller (NV-A960) with unit.
2. Playback the beginning of an NV-P26 cassette tape and wait until the tape movement has stabilized.
3. Insert the tension meter into the tape path between the take up guide post and the threading post.
4. Change the tape speed form X1/20 to X5, and note the tension as shown by the meter. All should be within 30 to 60 grams.
   When measuring make sure that the three post of the meter are all in good contact with the tape, as described below.

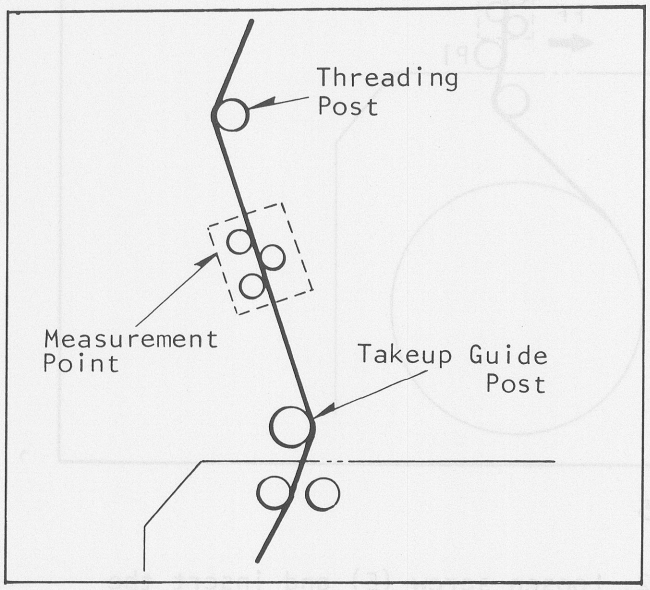


Fig. M52

B. Adjustment procedure

1. Playback the middle portion of an NV-P22S cassette tape at and wait until the tape motion has stabilized.
2. Adjust R52 (Reel servo P.C.B. VEP02101A) so that the take-up tension is 70 ± 5 g.
3. Repeat the measurement procedure (step 1 to 4) for reverse.
4. Playback an NV-P26 cassette tape, and go to REV normal speed (X1).
5. Insert the tension meter between Limiter post (P4) and A/C head.

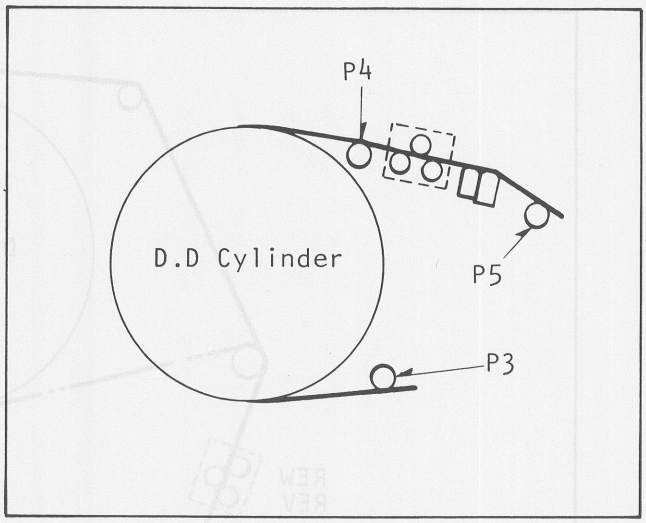


Fig. M53

6. Read of the meter tension as described above. The tape tension should be 20 g to 40 g.

27 CONFIRMATION OF FF TENSION

* Specification: 10 ∿ 30 g
* Equipment
  Tension meter (Tentel Co. model T2-H7-UM)
  3/4" Cassette Tape (NV-P26)

1. Insert an (NV-P26) Cassette tape and push the FF Button.
2. Place the tension meter between Limiter post (P1) and the head and read the meter. Tension should be between 10 and 30 grams.

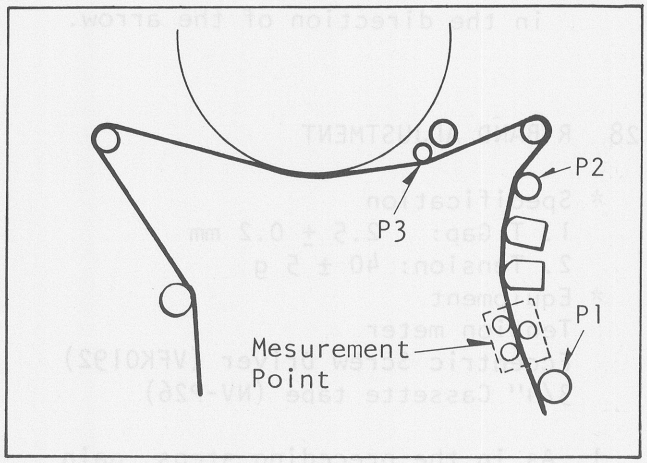


Fig. M54

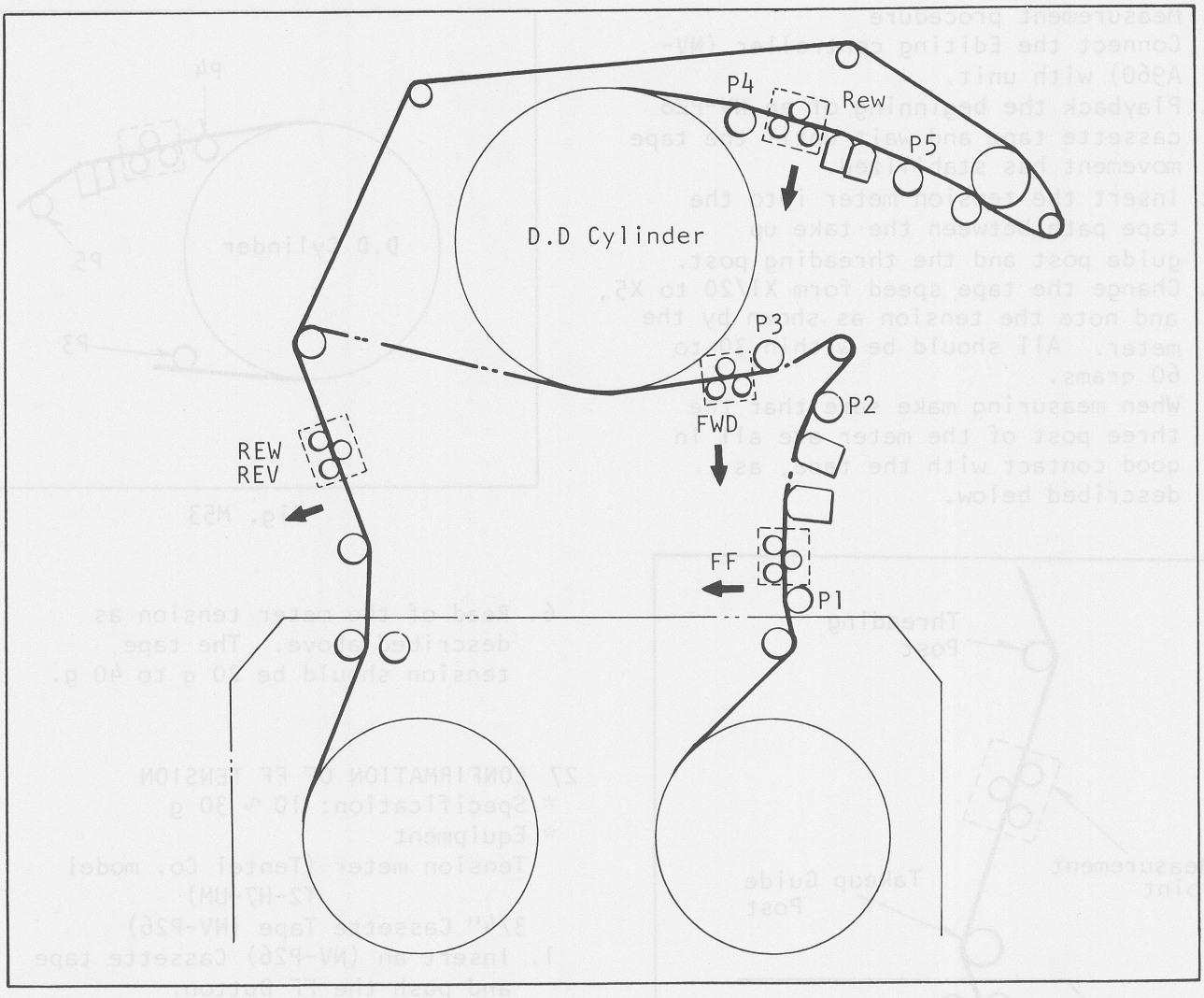


Fig. M55

Note: Tension should be checked at the points located in the drawing above and the tension meter should face in the direction of the arrow.

28 R BAND ADJUSTMENT

* Specification
  1. T Gap: 2.5 ± 0.2 mm
  2. Tension: 40 ± 5 g
* Equipment
  Tension meter
  Eccentric Screw Driver (VFK0192)
  3/4" Cassette tape (NV-P26)

1. As in the preceding steps, gain mechanical access and defeat the phototransistors and the safety switch. After insertion of a cassette into the removed carrier, activate the Rewind mode.
2. Loosen screw (E) and insert the eccentric screw driver into the hole (C).
3. Adjust the t gap so that that gap is 2.5 ± 0.2 mm.
4. Tighten the screw (E), and insert a cassette tape. Wind the tape until the supply reel tape diameter is 50 mm of the Take up Reel Tape diameter.
5. Insert the tension meter at point B and adjust the spring position, selecting the proper notch so that Tension is 40 ± 5 g.
6. Now wind the tape until the supply reel tape diameter is 120 mm of the Take-up Reel tape diameter.
7. Insert the tension meter at point B, and confirm that the tension is more than 30 g.

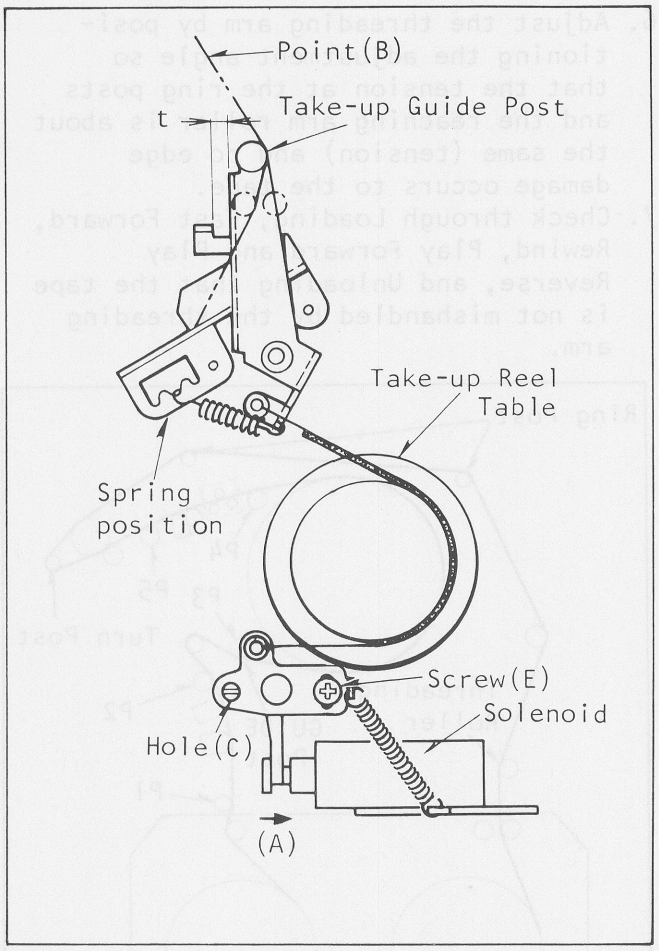


Fig. M56

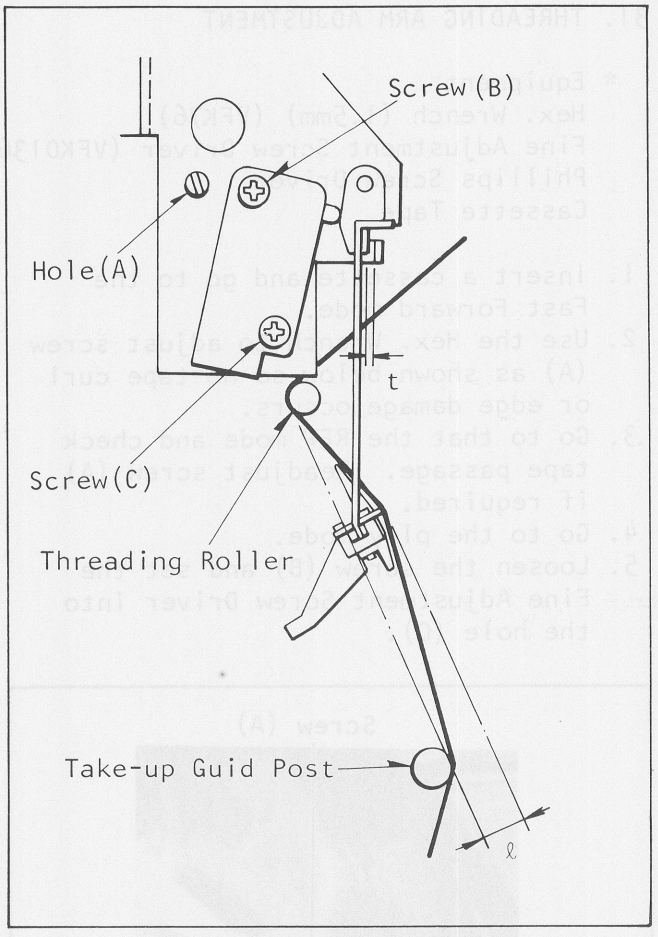


Fig. M57

29 SAFETY SWITCH ADJUSTMENT

* Specification:
  1. ℓ: 5 ∿ 8 mm
  2. t gap: more than 0.3 mm
* Equipment:
  Eccentric Driver (VFK0192)
  Phillips Screw Driver
  Cassette tape (NV-P26)

1. Remove the Top Panel.
2. Put the Cassette in and push the Play button.
3. Loosen the screw (B) and (C) and set the Eccentric Driver in hole (A).
4. Adjust so that the switch goes from ON to OFF when ℓ is 5 ∿ 8 mm.
5. Tighten screws (B) and (C) and confirm that when the switch is off, t gap should be more than 0.3 mm.
6. Confirm that the unloading will stop when the switch is OFF during unloading mode.

30 CONFIRMATION OF TAPE SPEED

* Specification:
  748.5 Hz Deviation 1.5 Hz
* Equipment:
  Alignment Tape (VFM2081D)
  Frequency Counter

1. Remove the Top Panel, and extend the Servo P.C.B. (VEP02100B1).
2. Connect the frequency counter to the Servo P.C.B. plug P232 Pin No. 1.
3. Playback the alignment tape and wait until the tape running has well stabilized.
4. Read the frequency counter and make sure that it is 748.5 Hz.

31. THREADING ARM ADJUSTMENT

* Equipment
Hex. Wrench (1.5mm) (VFK76)
Fine Adjustment Screw Driver (VFK0136)
Phillips Screw Driver
Cassette Tape

1. Insert a cassette and go to the Fast Forward mode.
2. Use the Hex. Wrench to adjust screw (A) as shown below so no tape curl or edge damage occurs.
3. Go to that the REW mode and check tape passage. Readjust screw (A) if required.
4. Go to the play mode.
5. Loosen the screw (B) and set the Fine Adjustment Screw Driver into the hole (C).

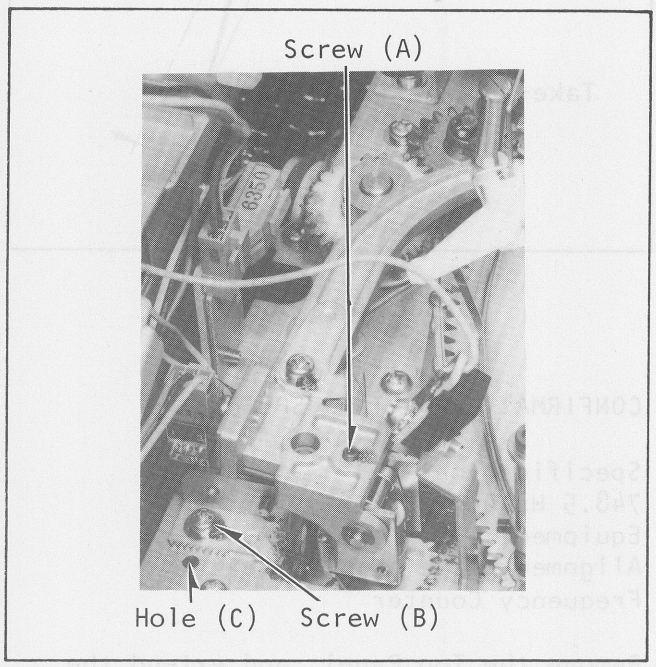


Fig. M58

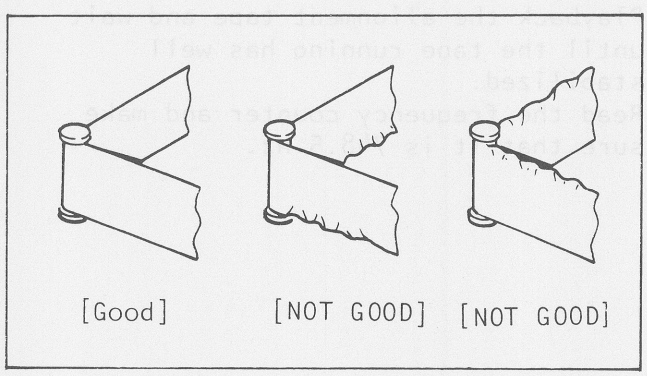


Fig. M59

6. Adjust the threading arm by positioning the adjustment angle so that the tension at the ring posts and the reaching arm roller is about the same (tension) and no edge damage occurs to the tape.
7. Check through Loading, Fast Forward, Rewind, Play Forward and Play Reverse, and Unloading that the tape is not mishandled by the threading arm.

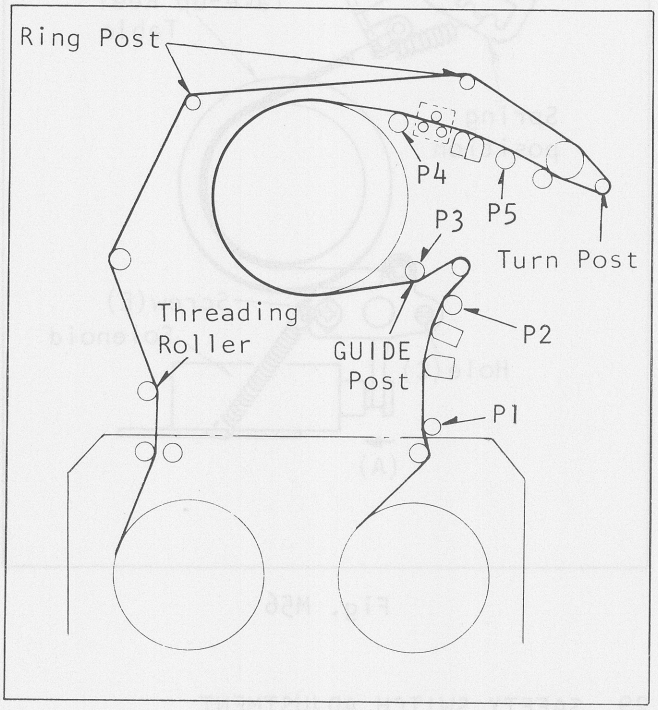


Fig. M60

32. TURN POST HEIGHT ADJUSTMENT

* Equipment
Hex. Wrench (VFK0146) (0.9mm)
Cassette Tape

1. As in the preceeding steps, gain mechanical access.
2. Connect the Editing Controller (NV-A960) with unit, and turn power ON.
3. Put a cassette in to the Cassette Compartment Base.
4. Playback the Cassette Tape and go to the REV X5 mode and wait until the tape running has stabilized.
5. Use the Hex. Wrench to loosen screw (A).
6. Adjust the Turn Post hight so that the edge curl does not occur on the P5 Limiter Post, and tighten Screw (A).

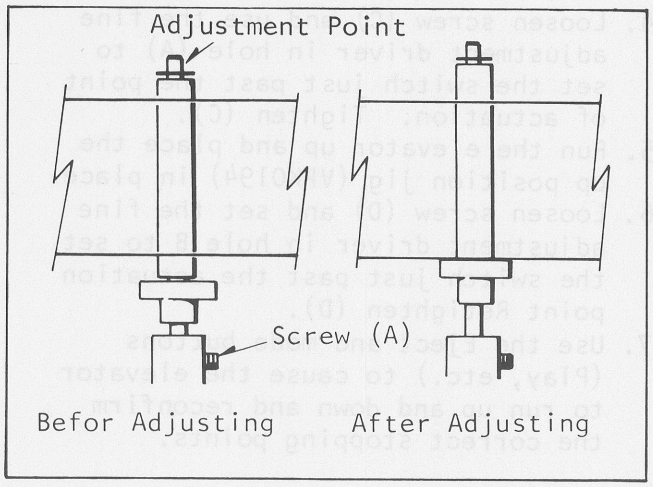


Fig. M61

7. If tape curl occurs between the Pressure Roller and P5 Limiter Post, adjust the Parallel of the Pressure Roller to be parallel to the Capstan.
8. Confirm that the tape curl does not occur P5 Limiter Post in the REV X1/20 mode.

33 BRUSH FORCE CONFIRMATION

* Specification:
  1) Brush and slip ring center should be concide.
  2) Brush deflection
     H = 1.5 - 2.9mm
* Equipment Required
  Screw driver
  Hex. Wrench (VFK77, VFK76)
  Eccentric driver (VFK0192)

1. Remove the top panel.
2. Confirm that the brushs are cencered in the groovs of the slip ring.
3. If brush is near the edge of the slip ring, it needs adjustment.
4. Loosen the Hex screw (A) (using VFK77).
   Turn the Hex screw (B) and adjust the center of brush and slip ring (using VFK76).
5. Observe that the brush deflection.
6. If out of specification (H=1.5 ∿ 2.9mm) adjustment is required.
7. Loosen the screw (C) and set the eccentric driver to the hole (D) then adjust it.

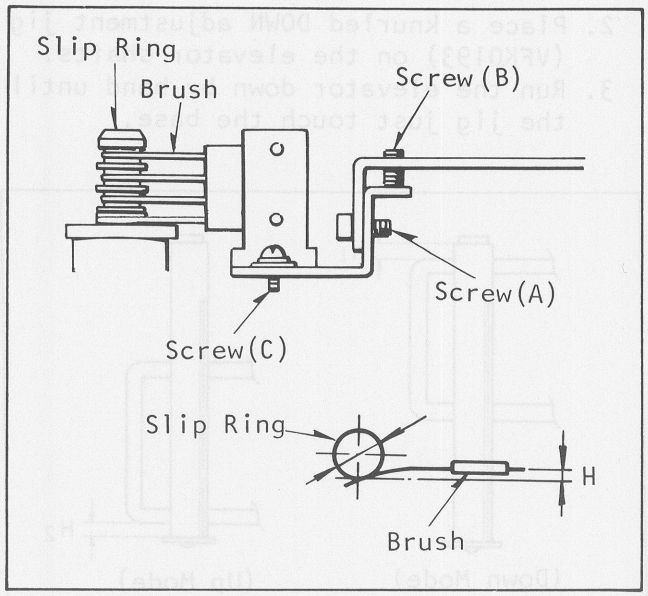


Fig. M62

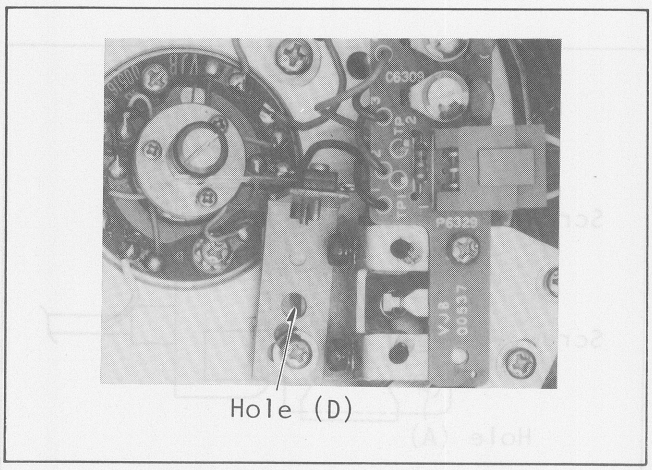


Fig. M63

34. ELEVATOR SW ADJUSTMENT

* Specifications
  1) H_1 = 0.6 ∿ 0.9 mm
     (When the down mode SW is ON)
  2) H_2 = 0.6 ∿ 0.9 mm
     (When the up mode SW is ON)
* Equipment Required
  Down SW Adjustment Jig (VFK0193)
  Up SW Adjustment Jig (VFK0194)
  Fine Adjustment Screw driver (VFK0136)
  Phillips screwdriver

1. As in the previous steps, gain mechanical access, remove the cassette compartment, defeat the phototransistors and the safety switch. Place a cassette into the removed compartment.

2. Place a knurled DOWN adjustment jig (VFK0193) on the elevator shafts.
3. Run the elevator down by hand until the jig just touch the base.

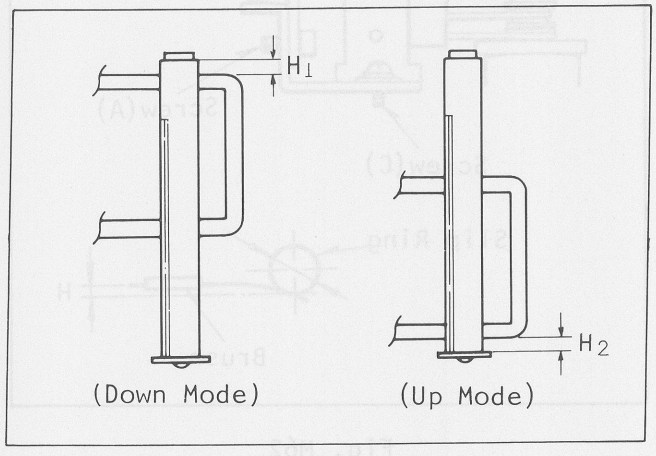


Fig. M64

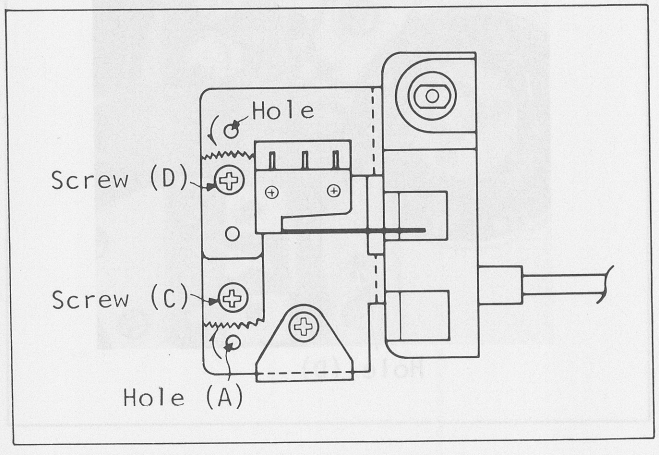


Fig. M65

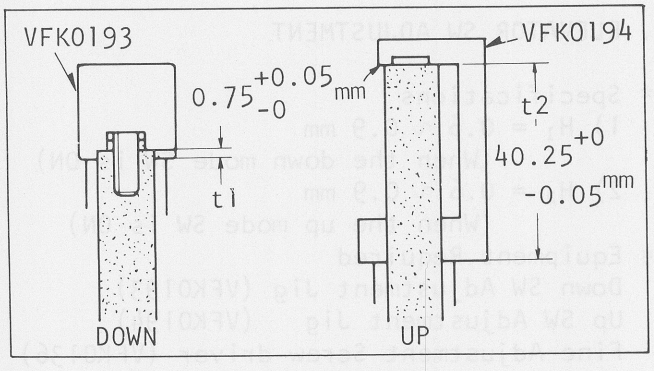


Fig. M66

4. Loosen screw (C) and use the fine adjustment driver in hole (A) to set the switch just past the point of actuation. Tighten (C).
5. Run the elevator up and place the up position jig (VFK0194) in place.
6. Loosen screw (D) and set the fine adjustment driver in hole B to set the switch just past the actuation point Retighten (D).
7. Use the Eject and mode buttons (Play, etc.) to cause the elevator to run up and down and reconfirm the correct stopping points.

35 CONFIRMATION OF STABLE TAPE RUNNING

1. Connect the Editing Controller (NV-A960) to the Unit.
2. Insert a Cassette tape, push the Play button. Cassette compartment Base.
3. Push the Search Button is go to REV X1/20.
4. Confirm that the Tape should be fit to the Limiter post less than 2 second.
5. Push the pause button and then release pause button.
6. Confirm that the tape should be fit to the Limiter Post less than 2 second.
7. Push the play Button, then push the search Button and set to REV x 5.
8. Confirm that the Tape should be fit to the Limiter post less than 2 second.
9. Push the pause button and then release Pause button.
10. Confirm that the tape should be fit to the Limiter post less than 2 second.
11. Push the play Button then push the search Button and set to FWD x 1/20.
12. Confirm that the tape should be fit to the Limiter post less than 2 second.

36 CONFIRMATION OF THE SKEW

* Equipment:
  Signal Generator
  Normal Tape (NV-P26)
* Specification:
  Skew fluctuation is less than 1/80H.

1. Connect the signal generator with unit.
2. Record a test pattern on the NV-P26 normal Blank cassette tape.
3. Playback the portion just recorded.
4. Confirm that the skew fluctuation is less than 1/80H.

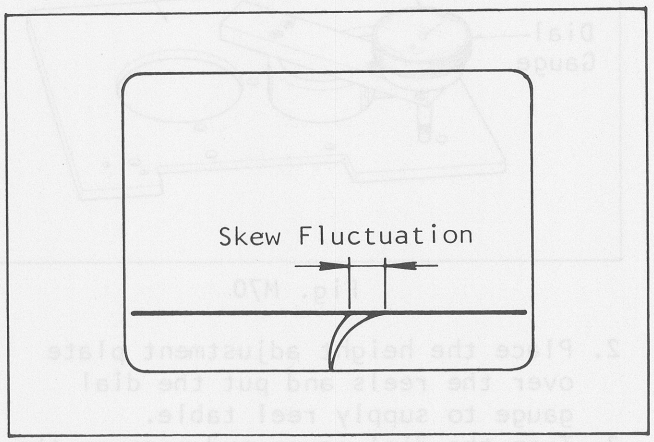


Fig. M67

37 LOADING-UNLOADING CONFIRMATION

1. Remove the Top panel. (Refer to section "DISASSEMBLY METHOD Item 2-2)
2. Put the normal cassette in to the cassette compartment base.
3. Push the play button. When the loading is performed push the stop button.
4. Confirm that the tape edge curl does not occur at Turn roller and Threading Post P1 ∿ P5.
5. Reverse above steps 3 and 4 about 5 times.
6. Connect the Editing Controller (NV-A960) with Unit.
7. Push the play button, then push the search button and set to REV x 1.
8. When the loading is performed push the stop button.
9. Confirm that the tape edge curl does not occur at turn roller and threading post P1 ∿ P5.
10. Reverse above steps 3 and 4 about 5 time.

38 CONFIRMATION OF PAUSE RISING

1. Connect the Editing Controller (NV-A960) with unit.
2. Confirm that the tape edge curl does not occur at transportation and Limiter Post P1 ∿ P5 as shown below mode.
   Pause → FWD x 5
   Pause → REV x 5
   Pause → FWD x 1/20
   Pause → REV x 1/20

39 CONFIRMATION OF FLYING VIDEO ERASE

* Equipment:
  Video Test Signal Generator
  Normal Tape (NV-P26) Blank

1. Connect the Signal Generator to the Unit.
2. Record the Color Bar signal for several minutes.
3. Playback the Color Bar portion just recorded.
4. Repeatedly insert Edit a different signal, such as crosshatch by pushing the Cut in and the Cut Out during the Color Bar playback.
5. Confirm that the color bar chroma does not appear at the start of the crosshatch.
6. Confirm no noise occurs at the entrance point or exit point. Check this by utilizing the 1/20 speed search mode and pause at the edit point.

40 PRESSURE ROLLER REPLACEMENT

* Equipment
  Hex Wrench VFK76 (1.5mm)

1. Remove the Top Panel (Refer to section "DISASSEMBLY METHOD" Item 2).
2. Loosen the screw (A) and remove the reinforcement angle. (see Fig.13)
3. Unscrew the Hex Screw (B) and remove the Pressure Roller.
4. Install the new Pressure Roller by reversing the above steps.

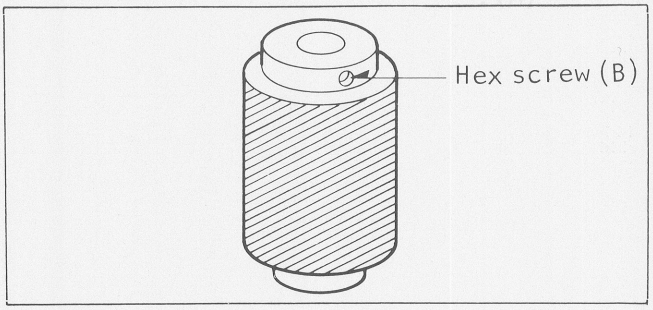


Fig. M68

41. CAPSTAN/PRESSURE ROLLER PARALLELISM

Equipment
Parallel Jig (VFK0196)
Hex. Wrench (VFK76)
(VFK0049)

1. Place the parallele jig (VFK0196) on the capstan shaft.
2. Slowly push the pressure roller solenoid by hand, and watch to see if the "V" shaped slots seat evenly.
3. If the pressure arm angle is not parallel, one side or the other will touch first.
Loosen Screws (A) in Fig. M69 and adjust Hex. screw (B) until the arm is parallel to the capstan.

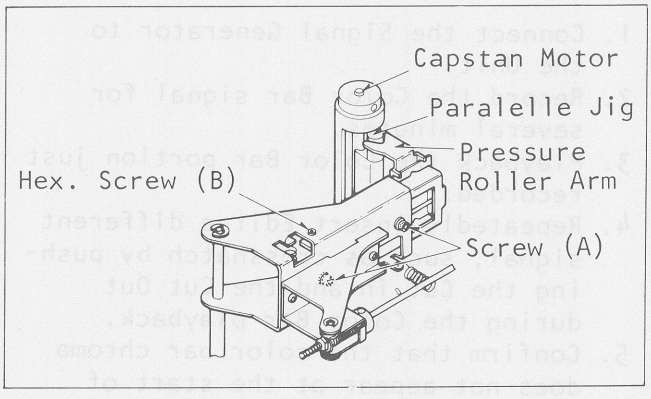


Fig. M69

42. SUPPLY/TAKE UP REEL TABLE REPLACEMENT/ADJUSTMENT

A. Replacement Procedure

* Equipment:
Phillips Screw Driver

1. Remove the top panel, front control panel, cassette compartment and cassette compartment base. (Refer to section 2-2, 2-4, 2-5, 2-8.)
2. Unscrew screw (A) and remove the supply and take up reel table.
3. Install the new supply and take-up reel table and tighten screw (A).

B. Adjustment Procedure

* Specification
Supply reel table height: 2.0mm∿2.2mm
Takeup reel table height: 0.8mm∿1.0mm

* Equipment
Reel table height adjustment Jig(VFK0198)
Reel table height adjustment Jig(VFK0199)

1. Place the dial gauge on the plate, and set the dial gauge to 0.5 mm.

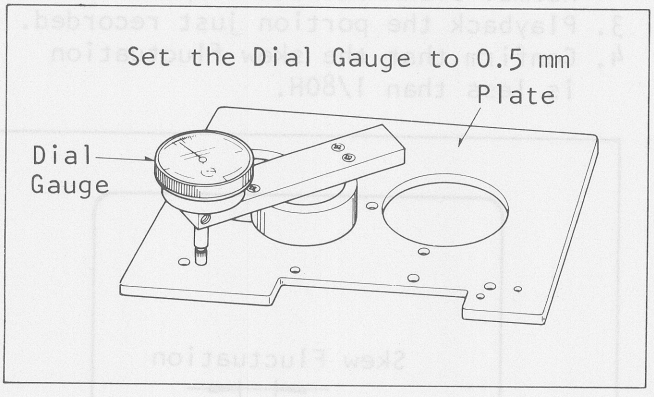


Fig. M70

2. Place the height adjustment plate over the reels and put the dial gauge to supply reel table.
3. Turn the dial gauge and measure the reel height.
And do same for the takeup reel table.

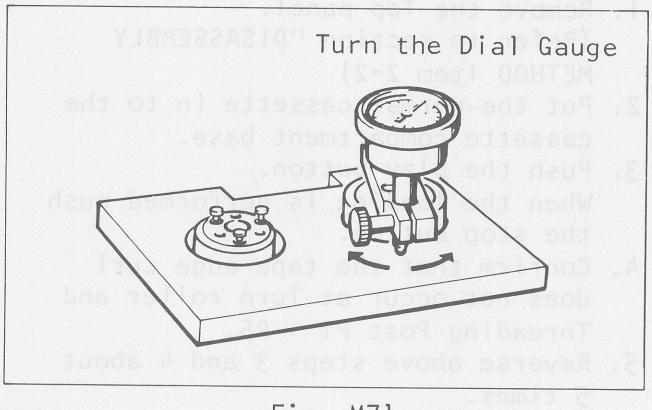


Fig. M71

4. If the out of specification (higher or lower), adjust the height of reel table to obtain the specified height.
5. For adjustment, change the polyslider washer located under the reel table (The washer is available in sizes of thickness, t = 0.13 mm, 0.25 mm and 0.5 mm.)

43 LOADING/UNLOADING SWITCH ADJUSTMENT

1. Loosen the two screws (A), and push the Loading/unloading switch unit as far to the right as possible.
2. Tighten the two screws (A).

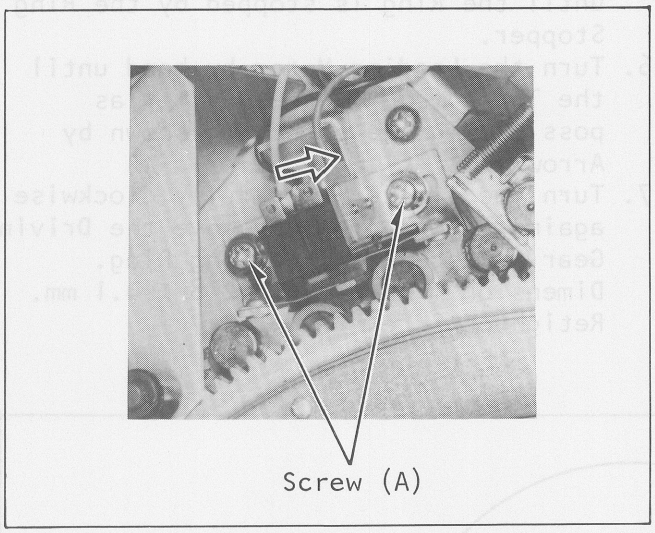


Fig. M72

3. Confirm that the two switches operate as shown in the table below.

	Loading Switch	Unloading Switch
Eject Mode	OFF	OFF
Subloading Mode	ON	OFF
During Loading /Unloading	ON	ON
Play Mode	OFF	ON

44 THREADING ARM AND SKEW POST POSITION ADJUSTMENT

* Specification: m = 22.8 ± 0.1 mm
  n = 0.3 ∿ 0.5 mm
  H = 0.2 ± 0.1 mm
  L = 0.2 ± 0.1 mm

* Equipments:
  Reel Hight Adj. Jig (VFK0198)
  Threading roller position Adj. Jig (VFK0215)
  Skew Post Position Adj. Jig. (VFK0216)
  Eccentric Screwdriver (VFK0192)
  Fine Adjustment Screwdriver (VFK0136)

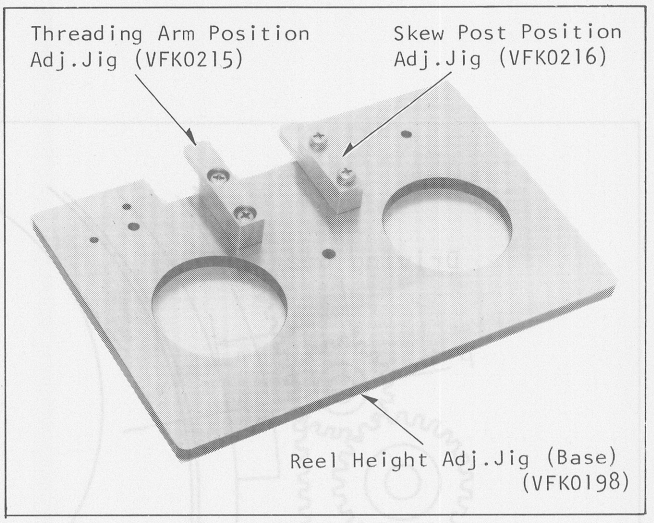


Fig. M73

Note: If the adjustment jigs (VFK0198, 0215, 0216) for Step 8 are not available, use the dimensions shown in Fig. M74. A pair of calipers will be useful but not required for Step 7.

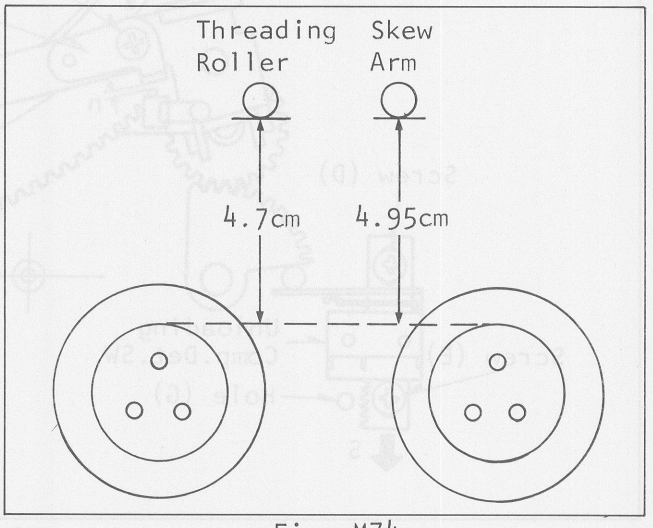


Fig. M74

Procedure

1. Loosen screw (A) and push the Driving Gear in the direction of Arrow (P) until it is disengaged. Note that the Limiter Gear is spring loaded. This tension will be released and must be rewound in Step 7.
2. Loosen Screw (B) and push the Threading Arm Stopper in the direction of Arrow (Q) as far as possible. Tighten Screw B temporarily to hold the Stopper.
3. Loosen Screw (C) and push the Skew Arm Stopper in the direction of Arrow (R) as far as possible. Tighten Screw (C) temporarily.
4. Loosen the 2 screws (D) and (E) and push the Unloading complete Detect switch (S) fully forward as shown by Arrow (S). Temporarily tighten the screws.
5. Turn the Loading Ring counterclockwise until the Ring is stopped by the Ring Stopper.
6. Turn the Loading Motor by hand until the Threading Arm goes as far as possible in the direction shown by Arrow (T).
7. Turn the Limiter Gear fully clockwise against the spring and move the Driving Gear to engage the Loading Ring. Dimension m should be 22.8 ± 0.1 mm. Retighten Screw (A).

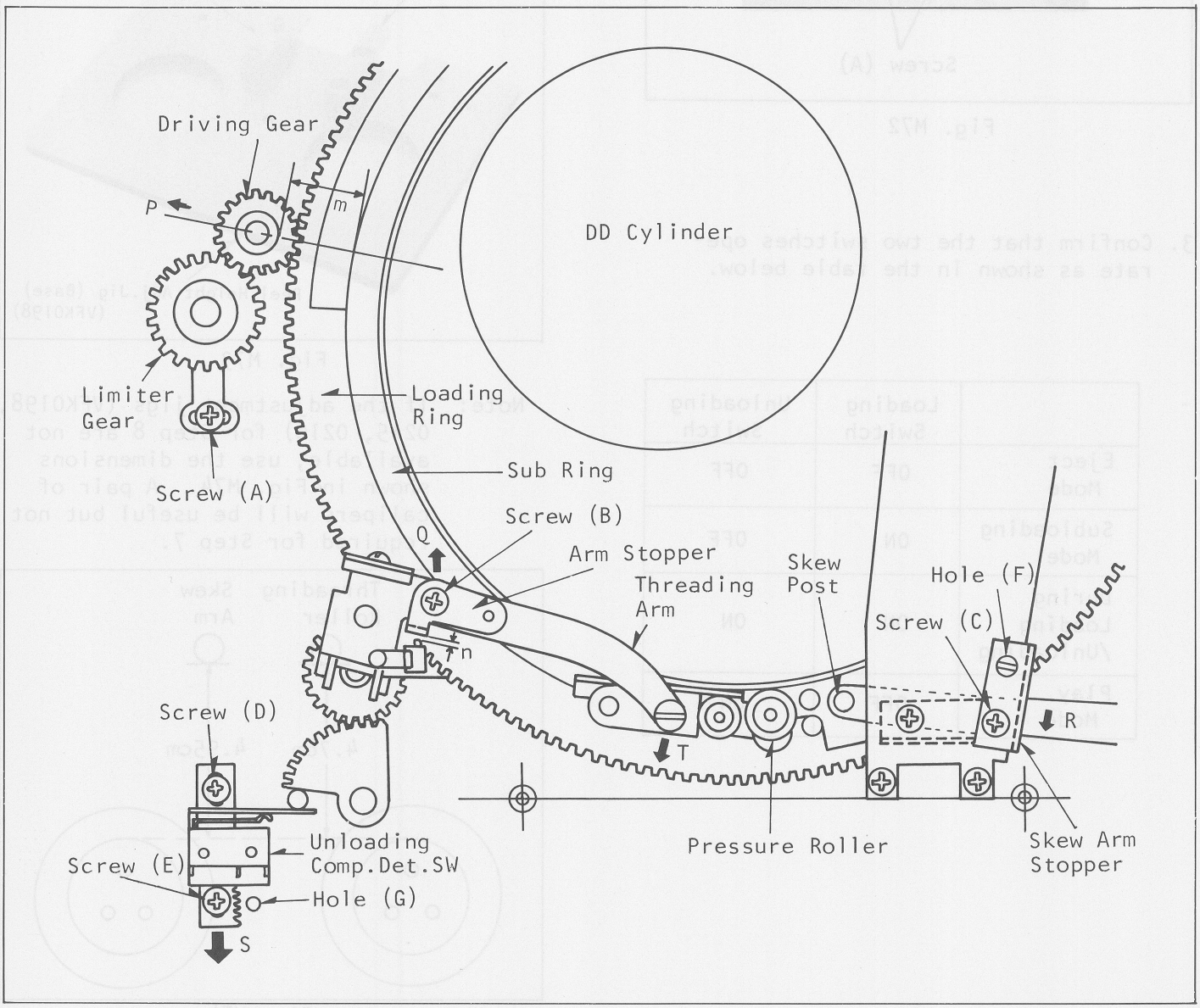


Fig. M75

8. Place the Reel Height Adj. Jig (VFK0198) with the Threading Roller Position Adj. Jig. (VFK0215) and the Skew post position Adj. Jig (VFK0216) over the reel tables and into position as shown in Fig. M76.
9. Alternate procedure
   Place a straight edge across the upper portion of the reel turntables. Measure from the outside edge of the Threading Roller or Skew Post to the straight edge as shown in Fig. M74.
10. Loosen Screw B and adjust the Arm Stopper position by hand so that dimension H is 0.2 ± 0.1 mm (or 4.7 cm, alternate). Retighten Screw (B).
11. Place the eccentric screwdriver in the hole (F) and loosen Screw (C). Adjust the Skew Arm Stopper position so that dimension L is 0.2 ± 0.1 mm (or 4.95 cm, alternate). Retighten Screw (C).
12. Rotate the Loading Motor by hand until dimension n (between Arm Stopper and Phototransistor angle) becomes 0.3 - 0.5 mm. Loosen Screws D and E and place the Fine Adjustment screwdriver in the Hole (G).
    Adjust the Unloading Complete Detect switch so that the switch just turns ON. Retighten Screws (D) and (E).
13. Operate the unit through the complete loading-unloading cycle and confirm the dimensions for the Threading Arm and Skew Post.

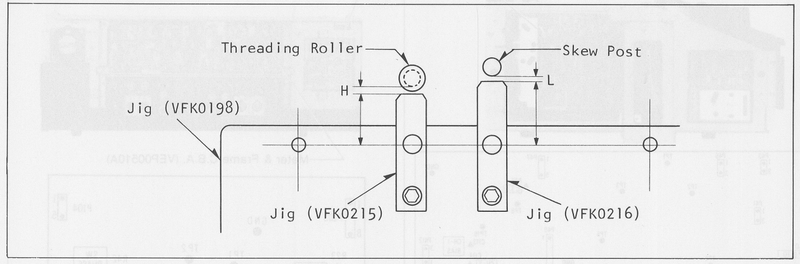
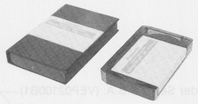


Fig. M76

Servicing Jigs & Tools

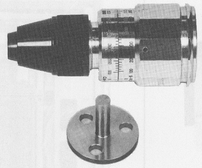
VFM2081D Alignment Tape

VFM2004D Time Code Alignment Tape

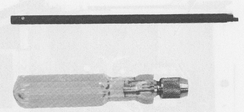


Back Tension Meter (T2-H7-UM)
(Tentelometer, Made in U.S.A.)

VFK0133 Dial Torque Gauge
VFK0171 Adaptor for VFK0133



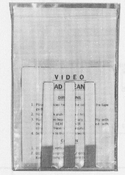
VFK0192 Eccentric Screwdriver



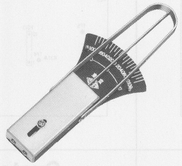
VFK0136 Fine Adjustment Screwdriver

VFK0049 Hex. Wrench (2.4mm)
VFK0146 Hex. Wrench (0.9mm)
VFK77 Hex. Wrench (2.0mm)
VFK76 Hex. Wrench (1.5mm)

VFK27 Head Cleaning Stick

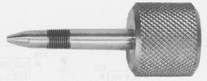


VFK66 Fan-type Tension Gauge (2kg)
VFK63 Fan-type Tension Gauge (500gr)

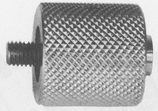


Spring Tension Gauge
VFK3 1,000gr (2.2 lbs)

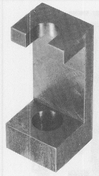
VFK0183 Dihedral Driver



VFK0193 Down SW Adjustment Jig

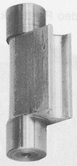


VFK0194 Up SW Adjustment Jig

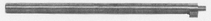


VFK0195 Box Wrench

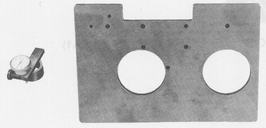
VFK0196 Paralelle Jig



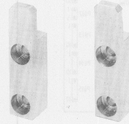
VFK0197 Eccentric Screw Driver



VFK0198 Reel Height Adj Jig (Base)
VFK0199 Reel Height Adj Jig (Dial)



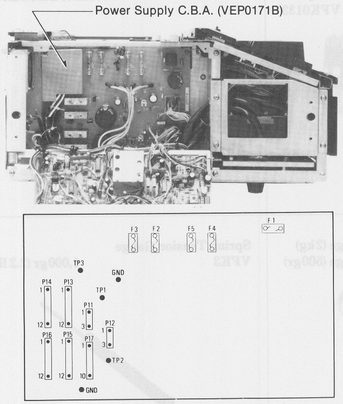
VFK0215 Threading Arm Position Adj Jig (Left)
VFK0216 Skew Post Position Adj Jig (Right)



Location of Test Points and Controls

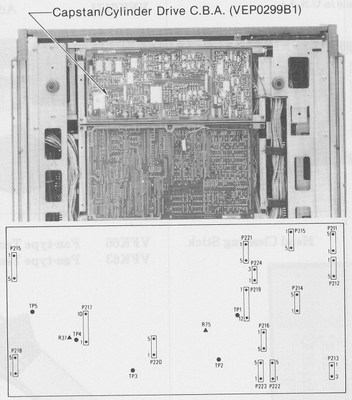
Power Supply C.B.A.

VEP0171B



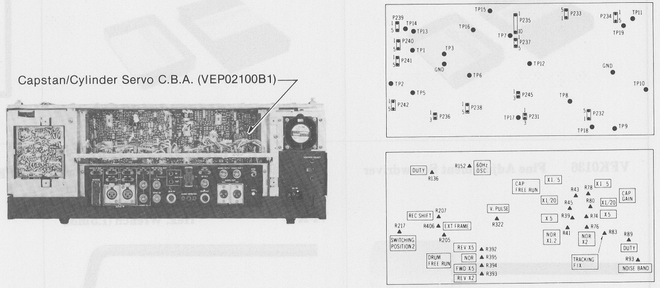
Capstan/Cylinder Drive C.B.A.

VEP0299B1



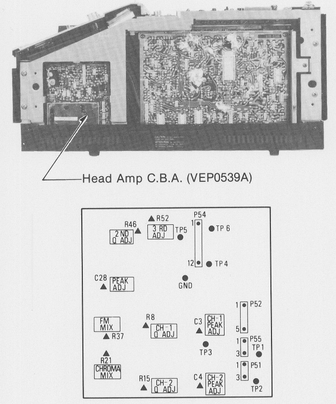
Capstan/Cylinder Servo C.B.A.

VEP02100B1



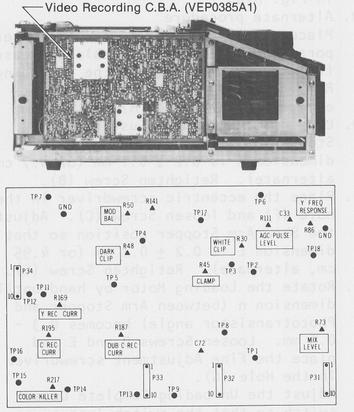
Head Amp C.B.A.

VEP0539A



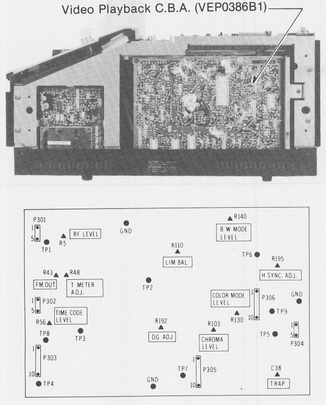
Video Recording C.B.A.

VEP0385A1



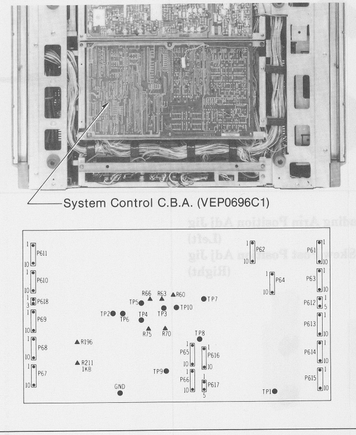
Video Playback C.B.A.

VEP0386B1



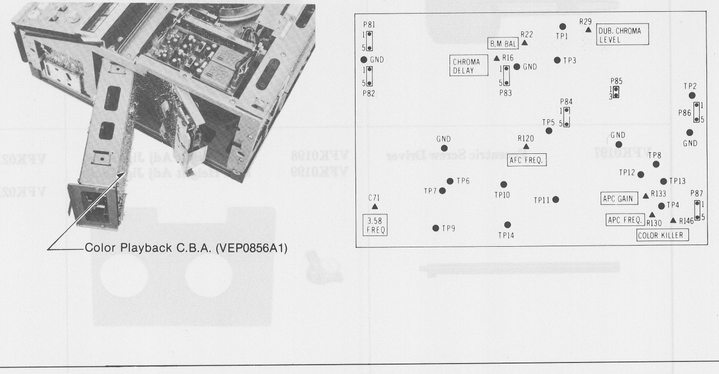
System Control C.B.A.

VEP0696C1



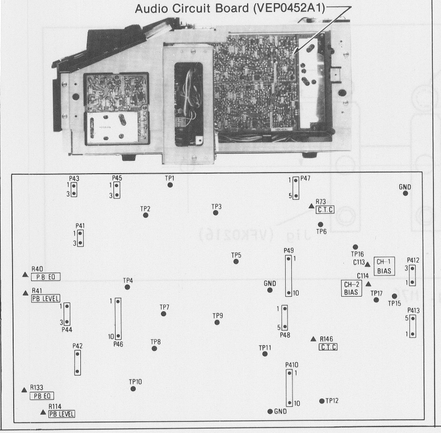
Color Playback C.B.A.

VEP0856A1



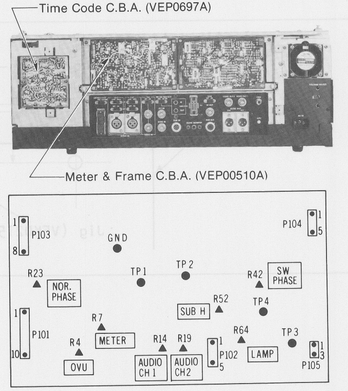
Audio Circuit Board

VEP0452A1



Meter & Frame C.B.A.

VEP00510A



ELECTRICAL ADJUSTMENT PROCEDURES

* Test Equipment

1. VTVM (Vacuum Tube Volt Meter) or high impedance digital voltmeter.
   Voltage Range: 0.005-50 V
2. Dual Trace Oscilloscope with Delay Function.
   Voltage Range: 0.005-5 V/div
   Frequency Range: 20 MHz
   Probes: 10:1 and 1:1
3. Frequency Counter
   Frequency Range: 0-10 MHz
4. Signal Generator
   Split-Field Color Bar Signal
   Stairstep Signal
   Sine Wave Signal; Frequency Range: 0-10 MHz
5. Reference Test Tape (VFM2081D)
   EIA Monoscope Pattern Signal
   (Audio: 1 kHz, -10 dB)
   Color Bar Signal with Music
   60% Multiburst Signal
   (Audio: 1 kHz, 0 dB)
   Only Control Signal
   (Audio: 3 kHz, 0 dB)
   Time Code Reference Tape (VFM2004D)
6. Video Sweep Generator
7. Color TV/Monitor
8. Plastic Tip Driver
9. Vectorscope
10. Waveform Monitor

* When to make Adjustments

The need for adjustments may be indicated by some of the following symptoms:

Servo Control Circuit

The Servo Control Circuit may need adjusting if:
1. There is total loss of servo. (Noise bar running through the picture.)
2. The playback picture is exceptionally noisy or unstable.
3. The head switching point is at the wrong point.

Video/Color Circuit

The video and color circuits may need adjusting if:
1. There are very low or very high output levels.
2. There is no playback or E-E color.
3. There is a beat in the picture.

Head Amp Circuit

The Head Amp Circuit may need adjusting if:
1. There is flicker in the playback picture.
2. There is a lack of picture detail.
3. The playback multiburst is not correct response.

Meter Circuit

The Meter Circuit may need adjusting if:
1. The audio and video meters do not correctly a reflect the input or output levels.
2. The Frame Lock or H Phase operate incorrectly.

* Speed Control

If an Edit Controller (NV-A960) is not available, the VTR can be put into the search speeds forward or reverse by grounding pins of the Remote Control Connector (P6345) according to the following table.

SPEED MODE	PIN NO. of P6345	
	FWD	REV
NORMAL		17
X2	19	19,17
X5	19,33	19,33,17
X1/5	30	30,17
X1/20	30,33	30,33,17

Note: When Started in the service manual, Rec/Play mode means Recording with the tape running. E-E mode means the input video signal appears at the output, but the tape is not running.

* Adjustment Procedure

1. Power Supply Circuit

Before adjusting the Power Supply Circuit, always check the AC input voltage (120V AC).
All controls and test points are located on the Power Supply C.B.A. (VEP0171B).

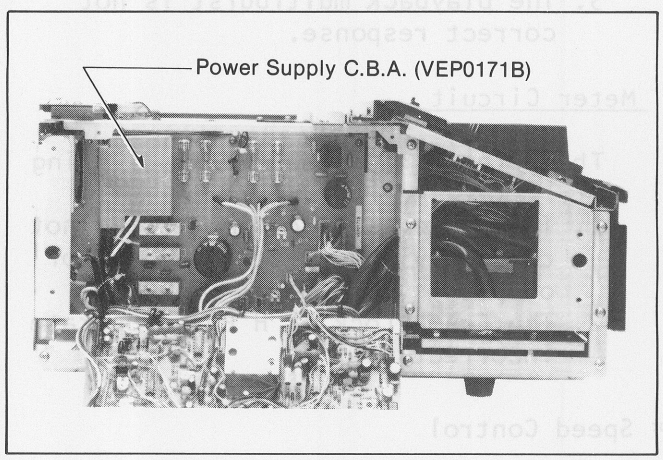


Fig. E1

1-1. DC +12 V Adjustment (REC mode)
Test Point: TP1
Adjustment: R6 (12V ADJ)
1. Connect a high impedance voltmeter to TP1.
2. Adjust +12 V Adj (R6) for 12.0 ± 0.2 V.

1-2. DC +24 V Adjustment (REC mode)
Test Point: TP2
Adjustment: R11 (24 V ADJ)
1. Connect a VTVM to TP2.
2. Adjust +24 V Adj (R11) for 24.0 ± 0.2 V.

2. Servo Control (VEP2100B1) and CAP/CYL Drive (VEP0299B1) Circuit

Before adjusting the Servo Control Circuit, confirm that the Frame Servo switch is OFF.

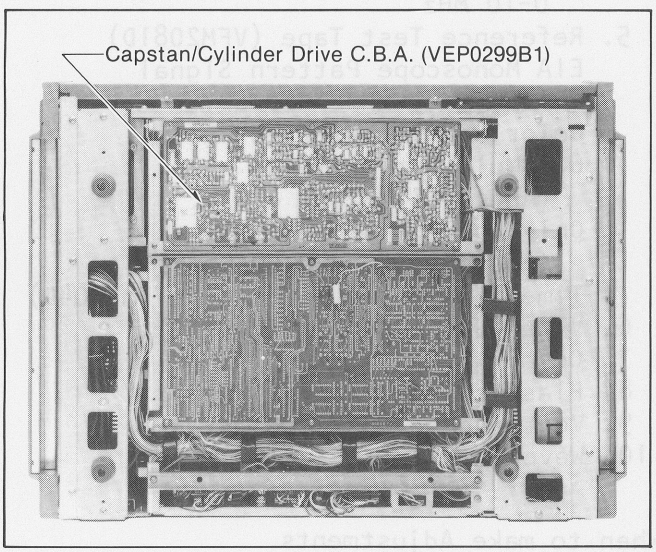


Fig. E3

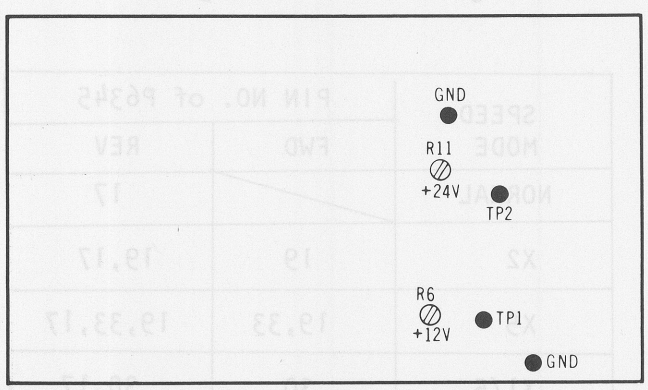


Fig. E2 : Power Supply C.B.A. (VEP0171B)

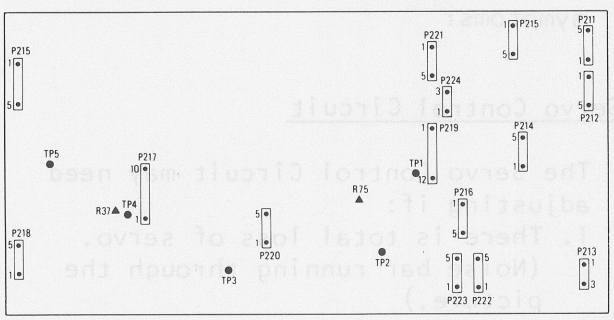


Fig. E4 : CAP/CYL Drive C.B.A. (VEP0299B1)

2-1. Cylinder Position Signal Adjustment
Test Point: TP4
Adjustment: R37 (CYL POS)
Mode: PLAY
Sync Selector: NORMAL
1. Connect the scope to TP4 on the CAP/CYL Drive C.B.A. (VEP0299B1).
2. Playback a recorded reference tape (VFM2081D).
3. Adjust CYL POS (R37) for 8.0 V ± 0.2 Vp-p as shown in Fig. E5.

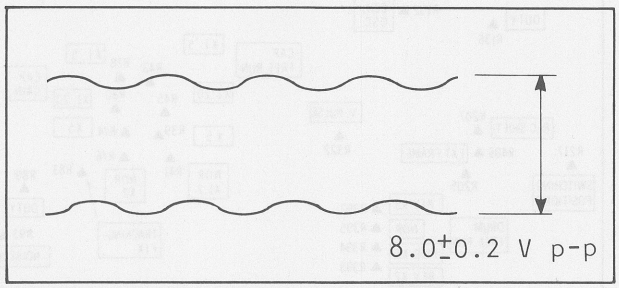


Fig. E5-a

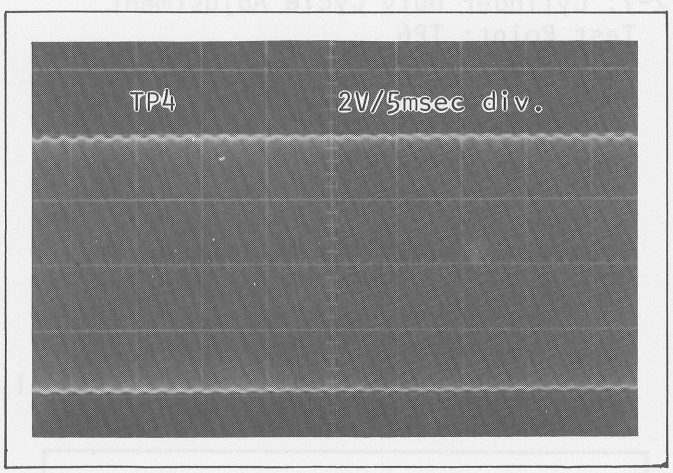


Fig. E5-b

2-2. Capstan Position Signal Adjustment
Test Point: TP1
Adjustment: R75 (CAP POS)
Mode: PLAY
Sync Selector: INT
1. Connect the scope to TP1 on the CAP/CYL Drive C.B.A. (VEP0299B1).
2. Playback a recorded reference tape (VFM2081D).
3. Adjust CAP POS (R75) for 11.0 V ± 0.2 V as shown in Fig. E6.

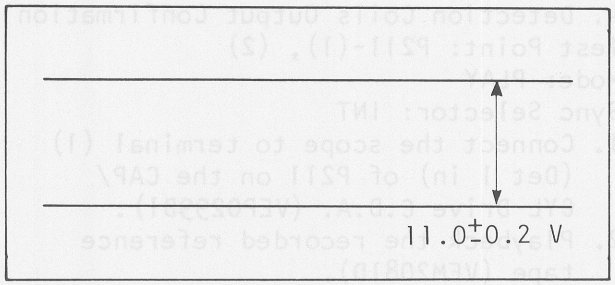


Fig. E6-a

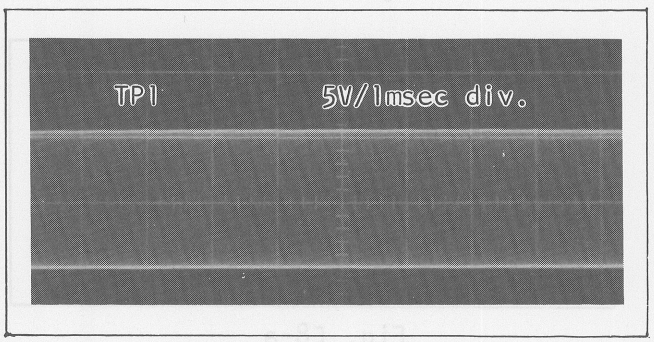


Fig. E6-b

2-3. Control Head Output Confirmation
Test Point: P213-(1)
Mode: PLAY
Sync Selector: INT
1. Connect the scope to P213-(1) on the CAP/CYL Drive C.B.A. (VEP0299B1) using a X1 probe.
2. Playback a recorded reference tape (VFM2081D).
3. Confirm the waveform at P213-(1) as shown in Fig. E7.

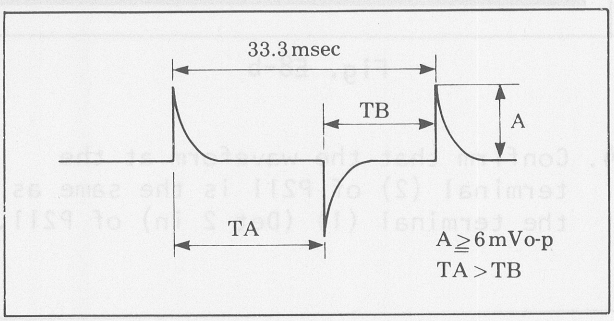


Fig. E7-a

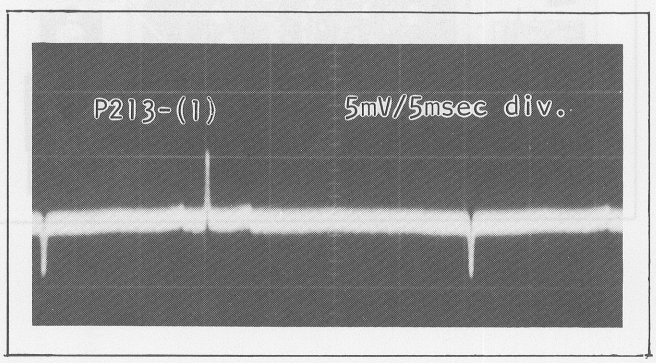


Fig. E7-b

2-4. Detection Coils Output Confirmation
Test Point: P211-(1), (2)
Mode: PLAY
Sync Selector: INT
1. Connect the scope to terminal (1) (Det 1 in) of P211 on the CAP/CYL Drive C.B.A. (VEP0299B1).
2. Playback the recorded reference tape (VFM2081D).
3. Confirm that the waveform is as shown in Fig. E8.

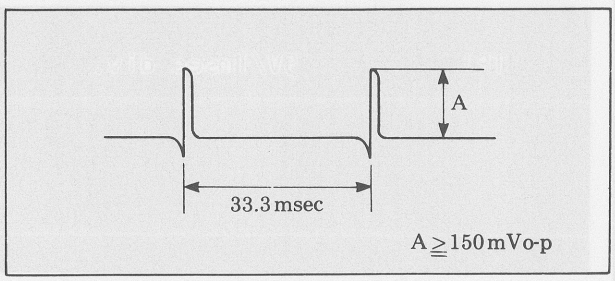


Fig. E8-a

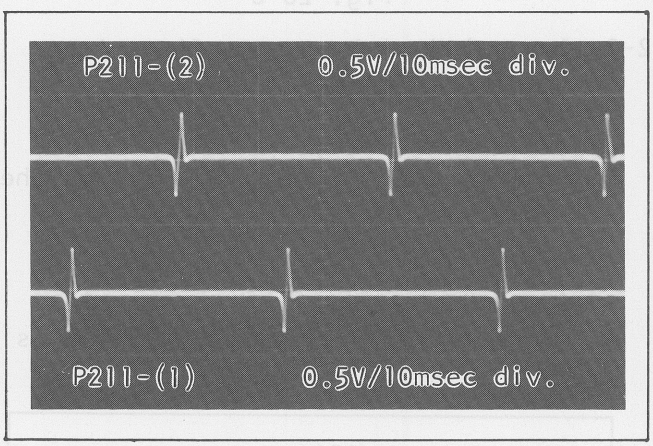


Fig. E8-b

4. Confirm that the waveform at the terminal (2) of P211 is the same as the terminal (1) (Det 2 in) of P211.

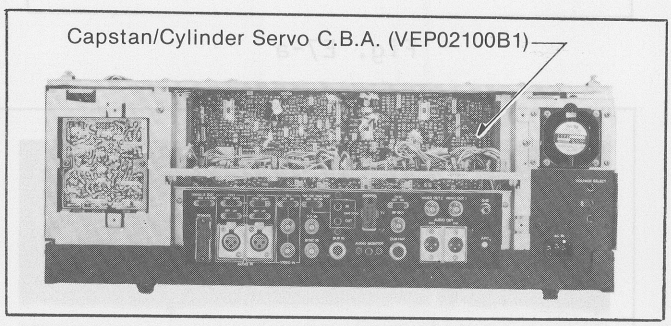
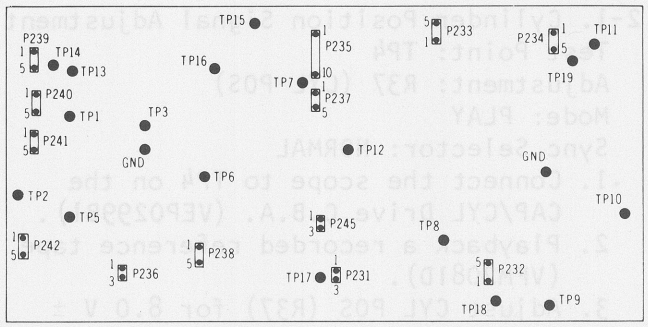


Fig. E9.



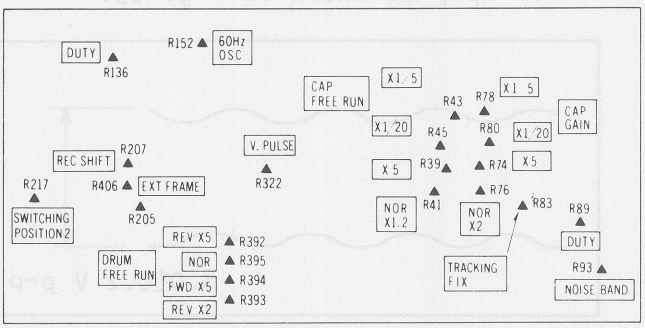


Fig. E10 : CAP/CYL Servo C.B.A. (VEP02100B1)

2-7. Cylinder Duty Cycle Adjustment
Test Point: TP6
Adjustment: R136
Mode: STOP
Sync Selector: NORMAL
Input Selector: LINE
1. Supply a color bar signal to the Video Input on the rear panel.
2. Connect the scope to TP6 on the CAP/CYL Servo Control C.B.A. (VEP02100B1)
3. Adjust DUTY ADJ (R136) so that the waveform becomes as shown in Fig. E11.

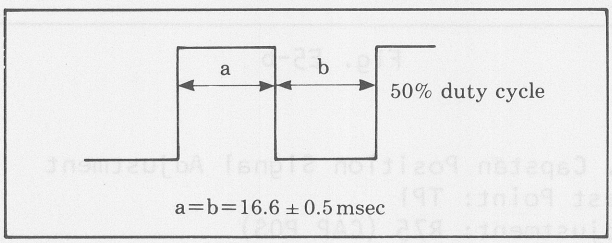


Fig. E11-a

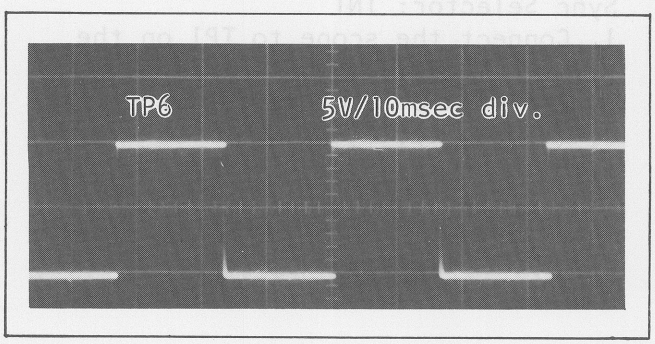


Fig. E11-b

2-6. 60 Hz OSC Adjustment

Test Point: TP16
Adjustment: R152 (OSC)
Mode: STOP
Sync Selector: EXT do not supply any signal.

1. Connect a frequency counter to TP16 on the CAP/CYL Servo C.B.A. (VEP02100B1).
2. Adjust 60 Hz OSC (R152) so that the indication of the frequency counter becomes 57.5 ± 0.5 Hz.

2-7. Cylinder Free Run Adjustment

Test Point: TP1, TP3, TP5
Adjustment: R395 (DRUM FREE RUN)
Mode: PLAY
Sync Selector: INT

1. Connect the scope CH1 to TP3 and CH2 to TP1 both on the CAP/CYL Servo C.B.A. (VEP02100B1), and set the scope to the ADD mode. Use TP3 signal for the scope.
2. Connect a frequency counter to TP5 on the same circuit.
3. Playback a Recorded Reference Tape (VFM2081D).
4. Turn DRUM FREE RUN (R395) fully counterclockwise, and then gradually clockwise just to the point where the sampling pulse locks on the trapezoidal waveform.
5. Disconnect P239 and read the indication of frequency counter at TP5. Note this as f_1.
6. Reconnect P239.
7. Turn DRUM FREE RUN (R395) fully clockwise, and then gradually counterclockwise just to the point where the sampling pulse locks on the trapezoidal waveform.
8. Disconnect P239 again and read the indication of frequency counter at TP5. Note this as f_2.
9. Adjust DRUM FREE RUN (R395) so that the frequency counter shows the average of f_1, f_2.
   $\frac{(f_1 + f_2)}{2}$ = average
10. Reconnect P239 and confirm that the sampling pulse locks on the trapezoidal waveform, as shown in Fig. E11.

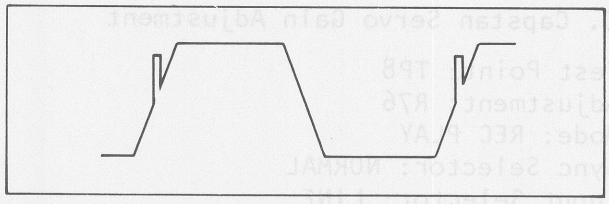


Fig. E12-a

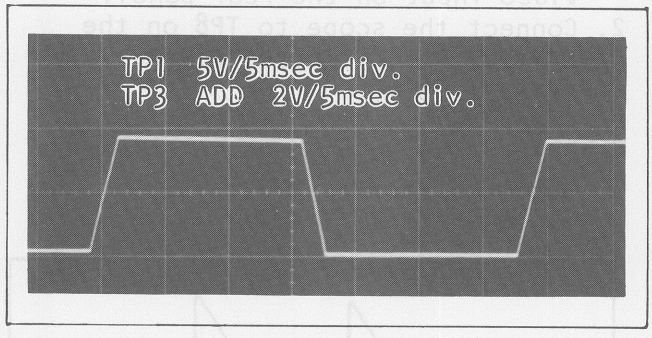


Fig. E12-b

2-8. Capstan Duty Cycle Adjustment

Test Point: IC10-pin 15
Mode: E-E
Sync Selector: INT
Input Selector: LINE

1. Supply a color bar signal to the Video Input on the rear panel.
2. Connect the scope to IC10-15 on the CAP/CYL Servo Circuit Board (VEP02100B1).
3. Adjust DUTY (R89) so that the waveform becomes as shown in Fig. E12.

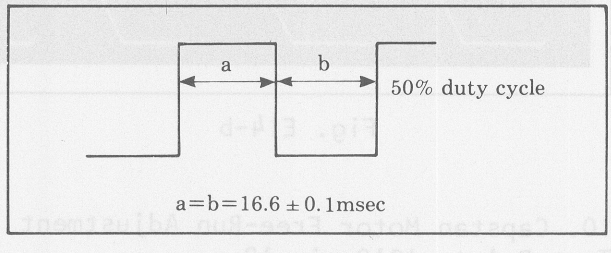


Fig. E13-a

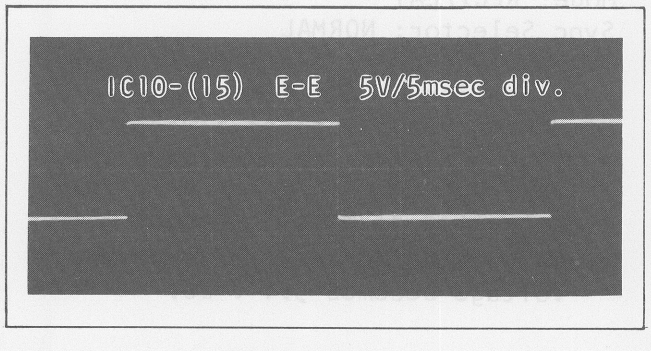


Fig. E13-b

2-9. Capstan Servo Gain Adjustment

Test Point: TP8
Adjustment: R76
Mode: REC PLAY
Sync Selector: NORMAL
Input Selector: LINE

1. Supply a color bar signal to the Video Input on the rear panel.
2. Connect the scope to TP8 on the CAP/CYL Servo Control C.B.A. (VEP02100B1).
3. Place the unit in REC/PLAY mode.
4. Adjust CAP GAIN (R76) so that T portions becomes 0.70 ± 0.05 msec as shown in Fig. E14.

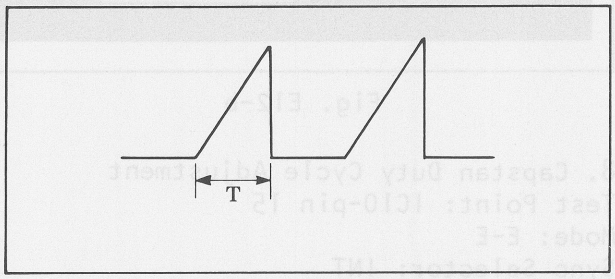


Fig. E14-a

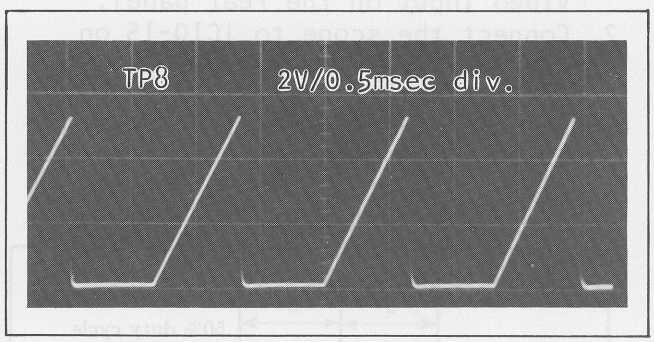


Fig. E14-b

2-10. Capstan Motor Free-Run Adjustment

Test Point: IC10-pin 12
Adjustment: R41
Mode: REC/PLAY
Sync Selector: NORMAL

1. Supply a color bar signal to the video input on the rear panel.
2. Make a recording for a while and then playback the poriton just recorded.
3. Connect a VTVM to 12 pin of IC10.
4. Adjust NOR X2 (R41) so that the voltage becomes 5.1 V DC.

Note: In the following steps, an Edit Controller may be used to select the speeds required.

2-11. Capstan Free-Run Adjustment (X5 PLAY)

Test Point: TP9, TP10, TP18
Adjustment: R39 (CAP FREE RUN X5), R74 (CAP GAIN X5)
Sync Selector: INT
Mode: X5 PLAY

1. Connect a frequency counter to TP18 on the CAP/CYL Servo C.B.A. (VEP02100B1).
2. Playback a recorded reference tape (VFM2081D).
3. Adjust X5 (R39), CAP GAIN X5 (R74) so that the frequency of TP18 becomes 937.5 Hz.
4. Connect the scope CH1 to TP9 and CH2 to TP10 on the CAP/CYL Servo C.B.A. (VEP02100B1) and set it to the ADD mode.
5. Adjust X5 (R39), CAP GAIN X5 (R74) so that the sampling pulse locks at the center of slope of the trapezoidal waveform as shown in Fig. E15.

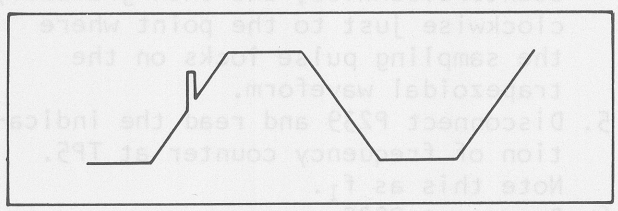


Fig. E15-a

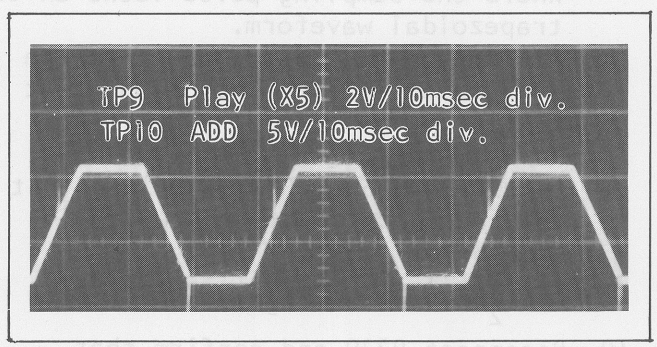


Fig. E15-b

2-12. Capstan Free-Run Adjustment (X1/5 PLAY)

Test Point: TP18
Adjustment: R43 (CAP FREE RUN X1/5)
Sync Selector: INT
Mode: X1/5 PLAY

1. Connect a jumper wire between ground and terminal (30) of the Remote Control Connector (P6345).
2. Connect a frequency counter to TP18 on the CAP/CYL Servo C.B.A. (VEP02100B1).
3. Playback a Recorded Reference Tape (VFM2081D)
4. Adjust CAP FREE-RUN X1/5 (R43) so that the frequency becomes 150 ± 2 Hz.
5. Remove the jumper from P6345.

2-13. Capstan Free-Run Adjustment (X1/20 PLAY)

Test Point: TP8, P232-(1)
Adjustment: R80 (CAP GAIN X1/20), R45 (CAP FREE RUN X1/20)
Sync Selector: INT
Mode: X1/20 PLAY

1. Connect a jumper wire between terminals (30) and (33) of the Remote Control Connector (P6345) and ground.
2. Connect a scope to TP8 on the CAP/CYL Servo C.B.A. (VEP02100B1), and connect a frequency counter to P232-(1) on the same board.
3. Playback a recorded reference tape (VFM2081D).
4. Adjust CAP GAIN X1/20 (R80) so that a becomes 2.7 ∿ 3.0 V as shown in Fig. E16.
5. Adjust CAP FREE RUN (R45) so that the frequency of P232-(1) becomes 42.0 ± 2.0 Hz.
6. Remove the jumper from P6345.

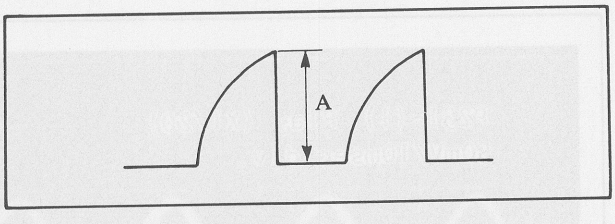


Fig. E16-a

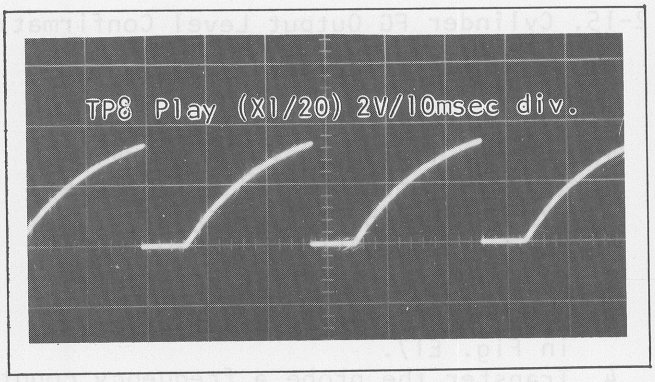


Fig. E16-b

2-14. Cylinder Free-Run Adjustment (SEARCH/PLAY)

Test Point: TP5
Adjustment: R392, R394, R395
Sync Selector: INT
Note: In place of the jumpers, an Edit Controller may be used to select speeds.

1. Connect a jumper wire between terminals (19) and (33) of the Remote Control Connector P6345 and ground. (X5 mode)
2. Playback a Recorded Reference Tape (VFM2081D).
3. Adjust DRUM FREE-RUN FWD X5 (R394) so that the frequency at TP5 becomes 1089.2 ± 2 Hz.
4. Transfer the jumper wire from terminals (19) and (33) of connector P6345 to terminals (19) and (17).
5. Adjust DRUM FREE-RUN REV. X2 (R393) so that the frequency becomes 1020.2 ± 2 Hz.
6. Transfer the jumper wire from terminals (19) and (17) of connector P6345 to terminals (17), (19) and (33) of connector P6345.
7. Adjust DRUM FREE RUN REV X5 (R392) so that the frequency becomes 993.6 ± 2 Hz.
8. Confirm that the noise bands are stationary in FWD X5, REV X2 and REV X5 mode on the TV monitor.

2-15. Cylinder FG Output Level Confirmation

Test Point: P211-(4)
Mode: PLAY
Sync Selector: INT

1. Connect the scope to the terminal (4) of connector P211 on the CAP/CYL Drive C.B.A. (VEP0299B1).
2. Insert a cassette and play it.
3. Confirm that the output voltage is between 300 mV and 500 mV as shown in Fig. E17.
4. Transfer the probe a frequency counter and confirm that the frequency is 2098 ± 5 Hz. If the voltage is not sufficient to operate the counter, observe P212-(4).

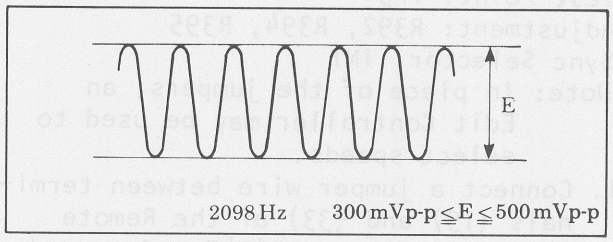


Fig. E17-a

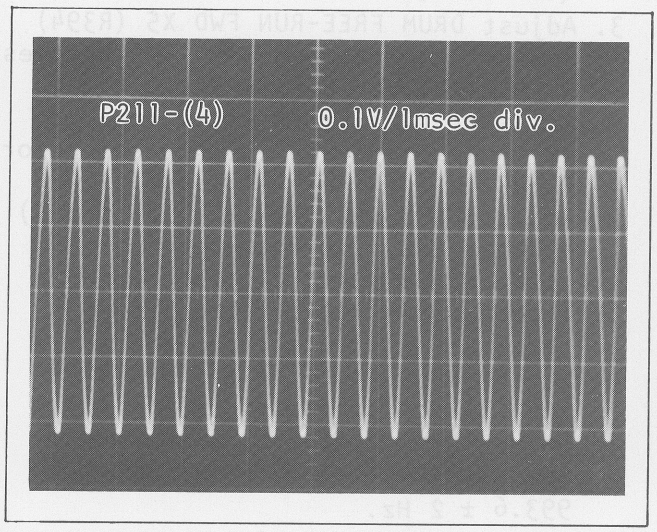


Fig. E17-b

2-16. Capstan Motor FG Output Confirmation

Test Point: P231-(1)
Mode: PLAY (X1/5, X1/20)
Sync Selector: INT
Note: Use an Edit Controller or Remote Control Plug jumpers to select X1/5 speed.

1. Connect the scope to P231-(1) on the CAP/CYL Servo C.B.A. (VEP02100B1) using a X1 probe.
2. Playback a Recorded Reference Tape (VFM2081D).
3. Confirm that the output voltage is 200 mVp-p or more in X1/5 playback, 50 mVp-p or more in X1/20 playback.
4. Transfer a probe to a frequency counter and confirm the frequency 150 ± 5 Hz in X1/5 playback, or 42 ± 5 Hz in X1/20 playback.

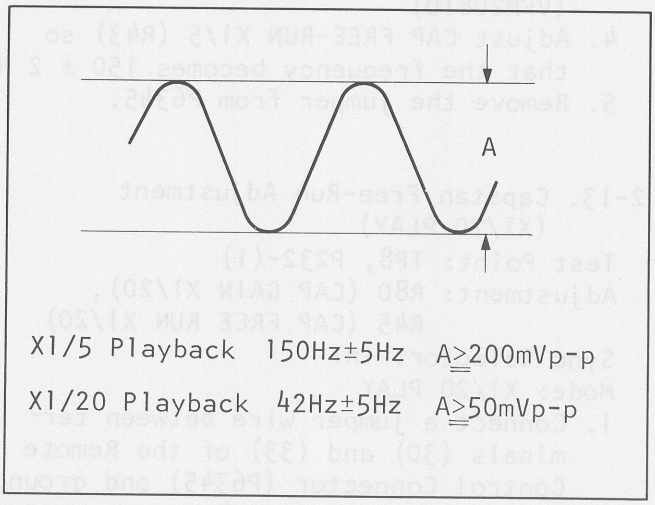


Fig. E18-a

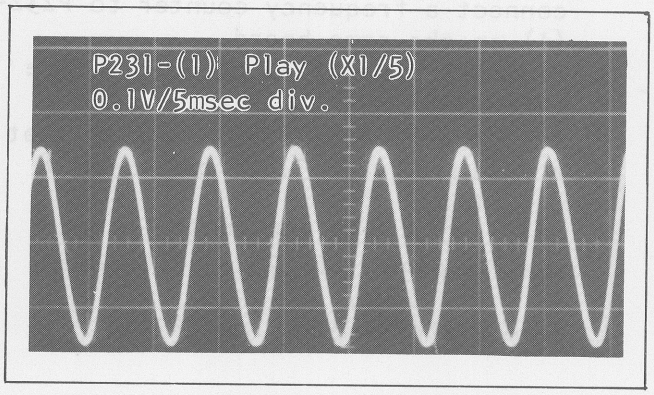


Fig. E18-b: X1/5 Playback

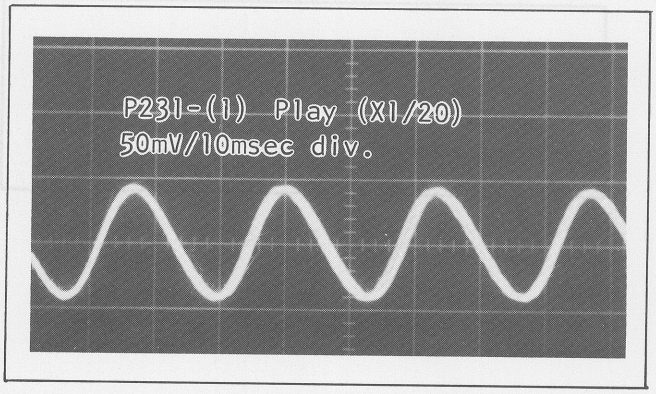


Fig. E18-c: X1/20 Playback

2-17. Switching Position Adjustment

Test Point: TP7 (VEP0386B1),
TP4 (VEP02100B1)

Adjustment: R205, R217

Mode: PLAY

Sync Selector: NORMAL

1. Connect the scope CH1 to TP4 on the CAP/CYL Servo C.B.A. (VEP02100B1) and CH2 to TP7 on the Video Playback C.B.A. (VEP0386B1), and set it to the CHOP mode. Use TP4 signal (VEP02100B1) for trigger of the scope.
2. Playback the Recorded Reference Tape (VFM2081D). (Monoscope Portion)
3. Set the scope to the delayed mode and expand the positive going edge of the switching pulse signal.
4. Adjust SW POSITION (2) (R217) so that the position of the rising edge of the switching pulse signal becomes A = 6.25 ± 0.1 H from the trailing edge of vertical sync pulse as shown in Fig. E19.
5. Adjust SW POSITION (1) (R205) so that negative going edge of head switching falls in the same relationship with the odd field.

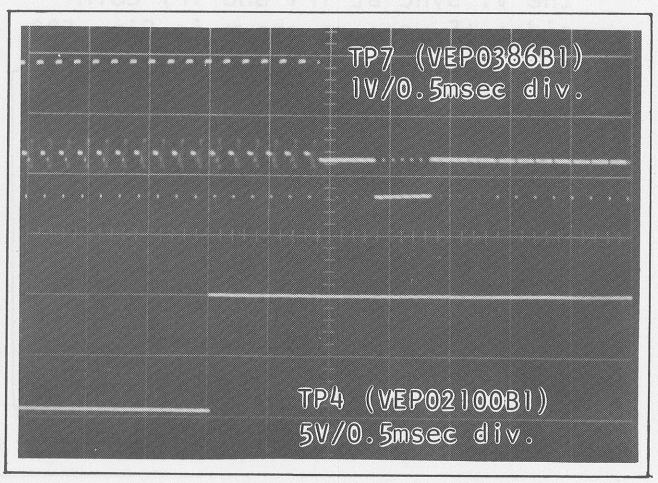


Fig. E19-b

2-18. Rec. Shifter Adjustment

Test Point: TP1 (VEP0385A1),
TP4 (VEP02100B1)

Adjustment: R207 (REC SHIFTER)

Mode: REC PLAY

Sync Selector: NORMAL

1. Supply a color bar signal to the Video Input on the rear panel.
2. Disconnect P239 and connect a jumper wire between TP13 and TP14 to defeat the frame servo function.
3. Connect the scope CH1 to TP4 on the CAP/CYL Servo C.B.A. (VEP02100B1) and CH2 to TP1 on the Video REC C.B.A. (VEP0385A1) and set it to the CHOP mode.
4. Place the unit in the REC mode with tape running.
5. Set the scope to the delayed mode and expand the display of TP1 to show the start of vertical sync.
6. Adjust REC SHIFT (R207) so that the A becomes A = 4.5 ± 0.5 H as shown in Fig. E20.
7. Stop the unit.
8. Disconnect the jumper wire between TP13 and TP14, and reconnect P239.
9. After the "Flaming Servo Circuit Adjustment", turn the Framing Switch on and readjust REC SHIFT (R207) so that the A becomes A=2.25 ± 0.1 H.

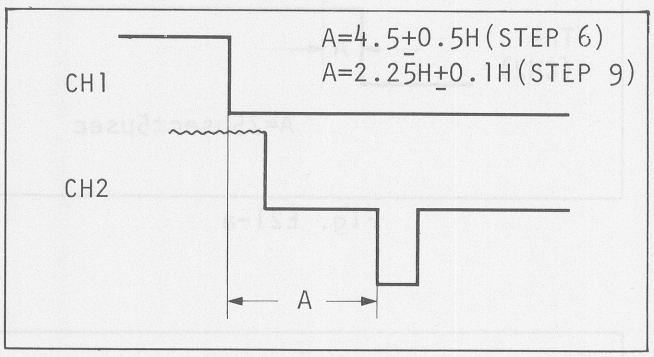


Fig. E20

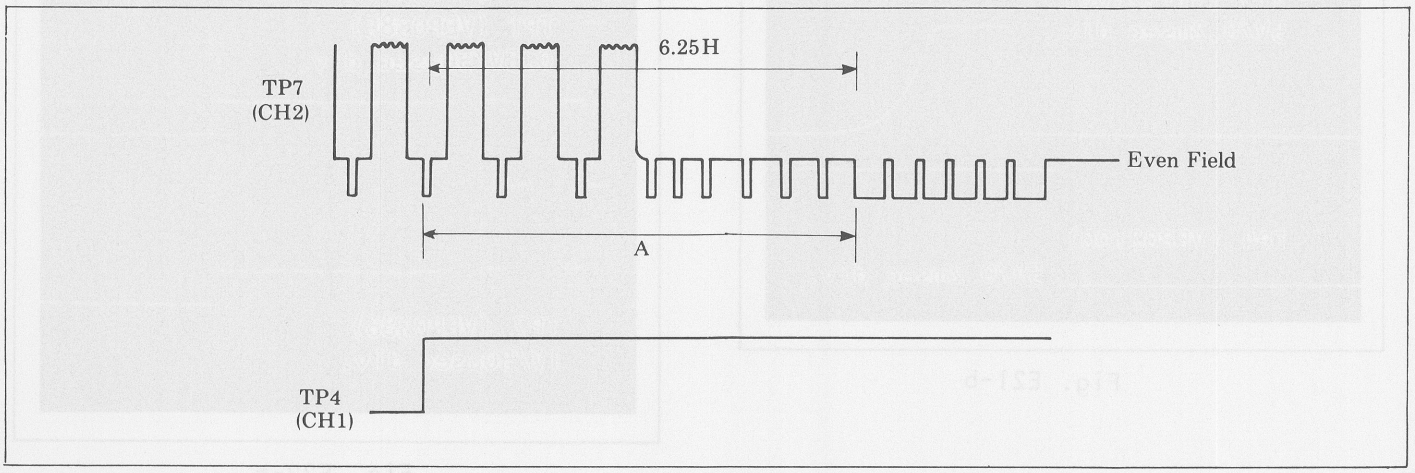


Fig. E19-a

2-19. V. Pulse Adjustment

Test Point: TP4, TP7

Adjustment R322 (V. PULSE ADJ)

Sync Selector: NORMAL

1. Connect the scope CH1 to TP7 and CH2 to TP4 and set it to the CHOP mode. Use CH1 as a trigger.
2. Supply a color bar signal to the Video Input on the rear panel.
3. Insert a cassette and make a recording.
4. Play back the recorded portion, press the PAUSE key and set the unit to the STILL mode.
5. Set the scope to the delayed mode and expand the display of TP4 to show the positive going edge of Head Switching pulse.
6. Adjust V. PULSE ADJ (R322) so that the positive edge of the V. pulse is 75 ± 5 µsec after the edge of Head Switching pulse as shown in Fig. E21.

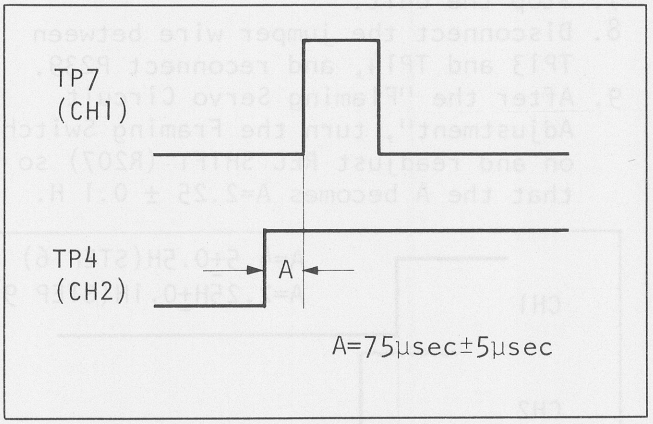


Fig. E21-a

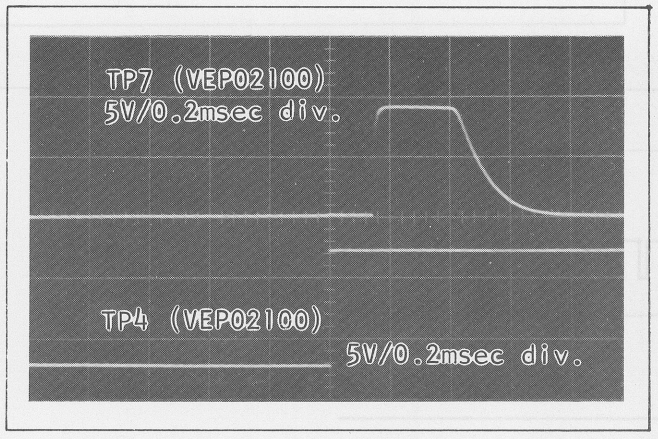


Fig. E21-b

2-20. Tracking-Fix Adjustment

Test Point: TP1 (VEP0385A1),
TP7 (VEP0386B1)

Adjustment: R83 (TRACKING FIX)

Sync Selector: NORMAL

Tracking VOL: FIX

Tracking Adj: Center Detent Position

H Phase Adj: Center Detent Position

1. Supply a video signal to the Video Input on the rear panel.
2. Connect the scope CH1 to TP1 on the video REC Circuit Board (VEP0385A1) and CH2 to TP7 on the P.B. C.B.A. (VEP0386B1).
   Use EXT trigger from TP4 on the CAP/CYL Servo C.B.A. (VEP02100B1)
3. Insert a cassette and make a recording. Rewind and playback the portion just recorded.
4. Set the scope to the delayed mode and expand the display of the start of vertical Sync. Use EXT trigger from TP7 on the CAP/CYL Servo C.B.A. (VEP02100B1).
5. While playback is taking place, adjust TRACKING FIX (R83) so that the V. Sync at TP1 and TP7 coincides ±5 µsec as shown in Fig. E22.

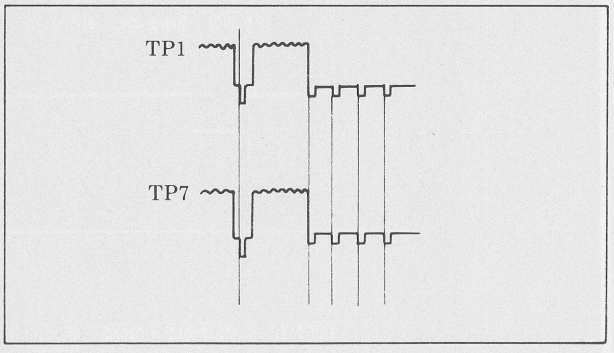


Fig. E22-a

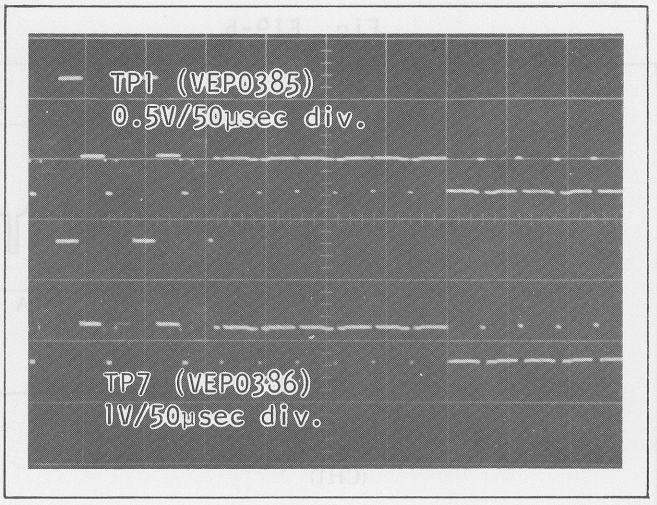


Fig. E22-b

2-21. Noise Band Adjustment of X2 Speed
Test Point: TV monitor
Adjustment: R93 (NOISE BAND)
Sync Selector: NORMAL
Tracking Adj: Center Detent Position

1. Supply an EIA monoscope pattern signal to the Video Input on the rear panel. (Monochrome convergence pattern may be used as an alternative).
2. Insert a cassette and make a recording.
3. Use an Edit Controller or connect a jumper between (19) of Remote Control Connector P6345 and ground. Playback the portion just recorded in the X2 mode.
4. Adjust NOISE BAND (R93) so that the noise band will be placed the upper portion of the monitor as shown in Fig. E23.
5. Playback an EIA monoscope pattern portion in a Recorded Reference Tape (VFM2081D) at X2 PLAY mode and confirm the same noise band location.

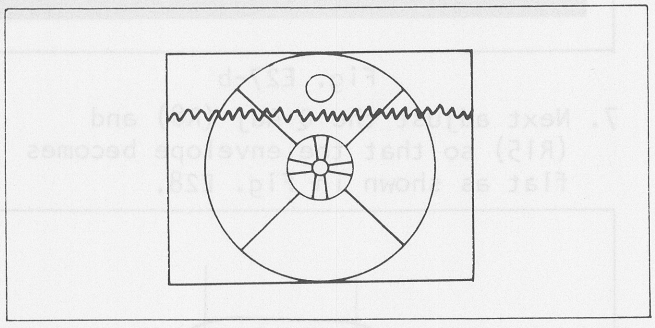


Fig. E23

3. Video & Color Circuit with Head Amp Circuit

Before proceeding with these adjustment procedures preset the following control functions:

A) Video Recording Level Selector: AGC
Video Mode Selector: Auto
APC Adjust: Center Detent Position
Chroma Level Control: Center Detent Position
Sync Mode Selector: NORMAL
Input Signal Selector: LINE
Frame Servo Switch: OFF
Tracking Control: Center Detent
Head Amp Frequency Adj.: Center Detent Position

B) Prior to the Color Killer Adjustment (3-19 and 3-20), follow this procedure to set the unit in the desired mode.

Color Mode:

1. Turn R217 on the Video Recording Circuit Board (VEP0385A1) fully counterclockwise.
2. Turn R146 on the Color Playback Circuit Board (VEP0856A1) fully clockwise.
3. Connect a jumper wire between TP8 and TP15 on the Video Recording Circuit Board (VEP0385A1).
4. Connect a jumper wire between TP8 and GND on the Color Playback Circuit Board (VEP0856A1).

B/W Mode:

1. Step 1 and 2 are the same as for the color mode.
2. Disconnect the jumper wires between TP8 and TP15 (Video Rec), TP8 and GND (Color P.B.), steps 3 and 4 above.

C) Video Sweep Signal with Sync
When a video sweep signal is called for the amplitudes should be as shown in Fig. E24.

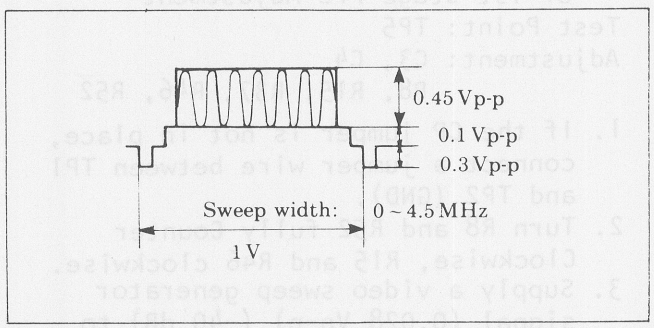


Fig. E24

D) Tapeless Playback
In order to have playback with no tape, follow the procedure as outlined in the Mechanical Adjustments:

1. Ground the Safety Switch.
2. Cover the photo sensor LEDs.
3. Short the three pins of P6338 or place a cassette in the removed carriage.

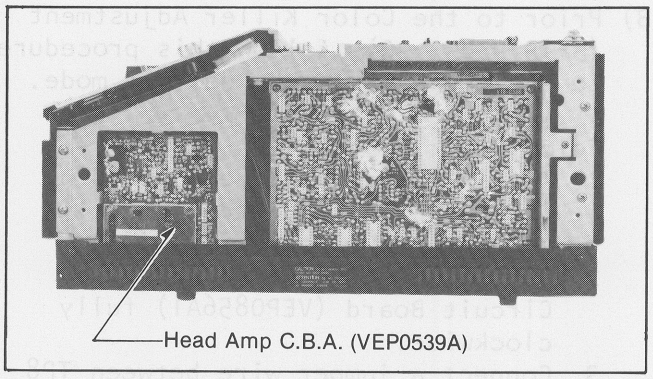


Fig. E25

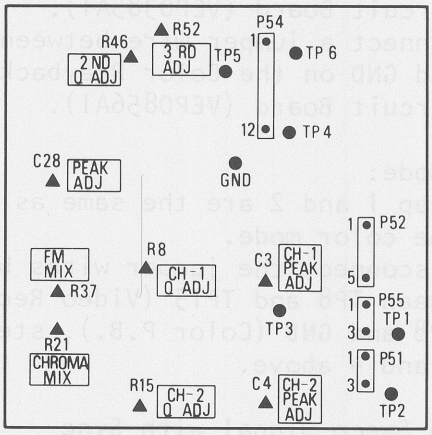


Fig. E26 : Head Amp C.B.A. (VEP0539A)

3-1. Head Amp Frequency Characteristics of 1st Stage Pre-Adjustment

Test Point: TP5
Adjustment: C3, C4
R8, R15, R37, R46, R52

1. If the CP jumper is not in place, connect a jumper wire between TP1 and TP2 (GND).
2. Turn R8 and R52 fully Counter Clockwise, R15 and R46 clockwise.
3. Supply a video sweep generator signal (0.028 Vp-p) (-40 dB) to TP3 on the Head Amp C.B.A. (VEP0539A).
4. Connect the scope to TP5 on the Head Amp C.B.A. (VEP0539A) and place the unit in the play mode with no tape.
5. Adjust Peak Adj (C3) and (C4) so that the peak frequency of the envelope becomes 6 MHz for both channels as shown in Fig. E27.
6. Now adjust the FM Mix (R37) so that the amplitude at the 1-2 MHz portion becomes equal for both channels within 1 dB.

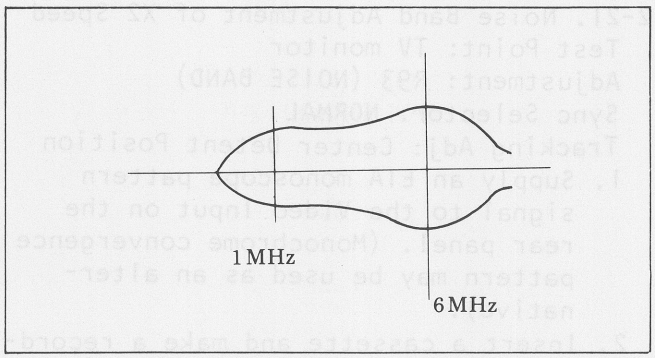


Fig. E27-a

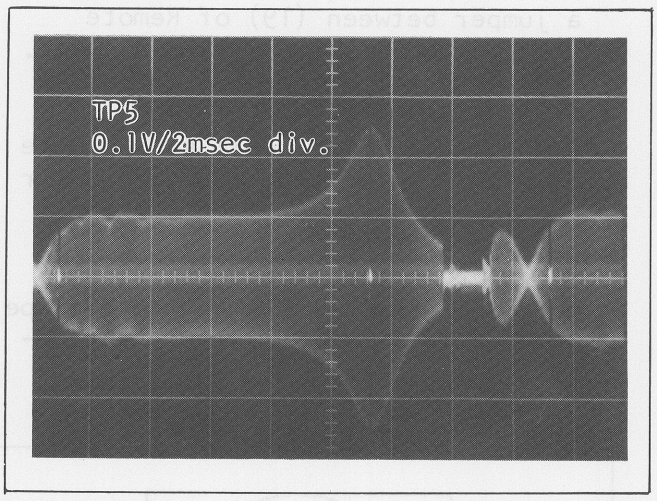


Fig. E27-b

7. Next adjust the Q Adj (R8) and (R15) so that the envelope becomes flat as shown in Fig. E28.

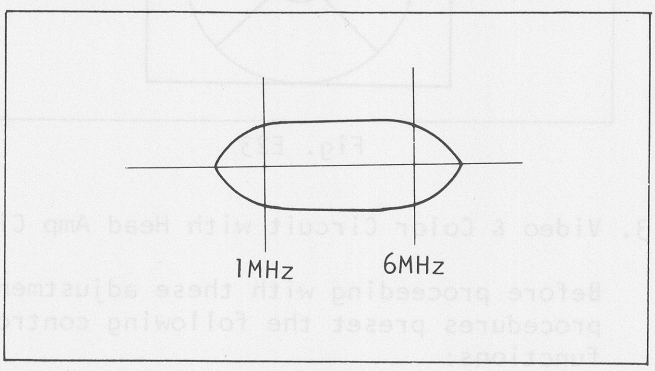


Fig. E28-a

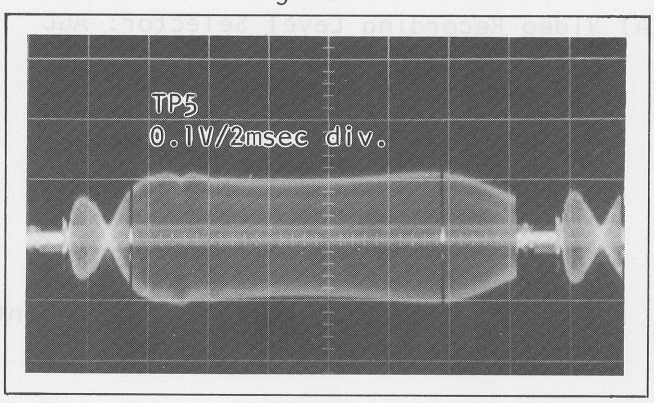


Fig. E28-b

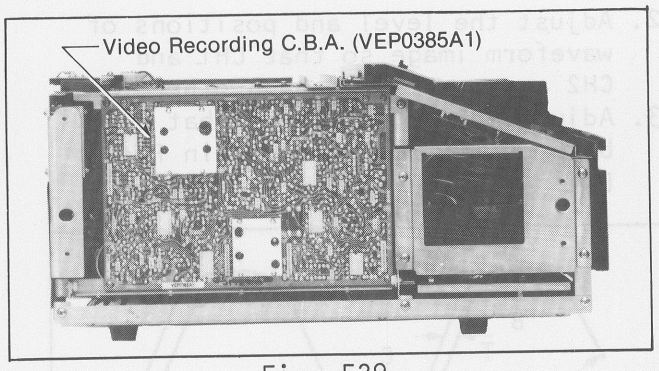


Fig. E29

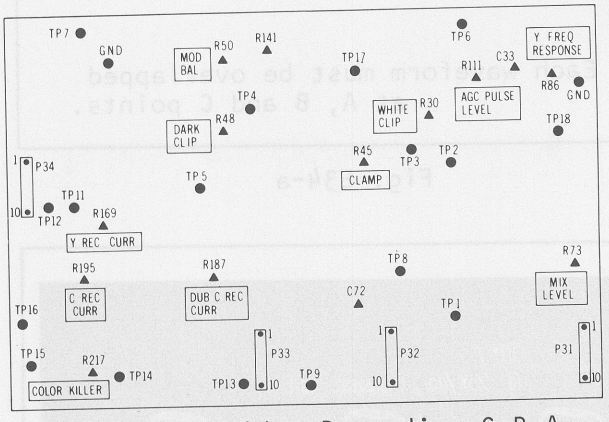


Fig. E30 : Video Recording C.B.A. (VEP0385A1)

3-2. Comb Filter Adjustment

Test Point: TP18, TP2
Adjustment: R73, T2, R86, C33
Mode: STOP
Video Mode Selector: Color
Input Selector: LINE
Sweep Marker: 1, 2, 3 MHz

1. Supply a color bar signal to the video input on the rear panel.
2. Connect the scope (1:1 Probe) to TP18 on the Video Recording C.B.A. (VEP0385A1).
3. Adjust MIX LEVEL (R73) and COMB PHASE (T2) repeatly so that the chroma component on each step becomes minimum and balanced as shown in Fig. E31.

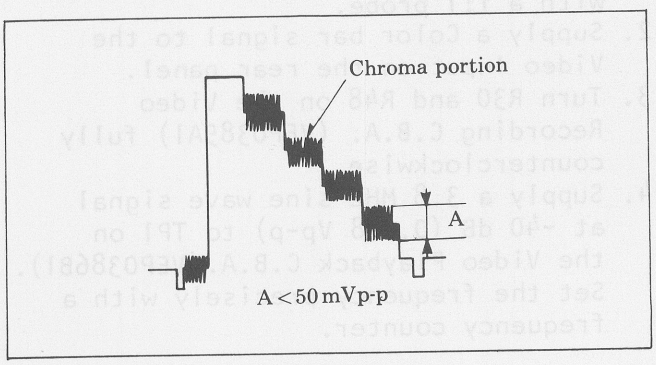


Fig. E31-a

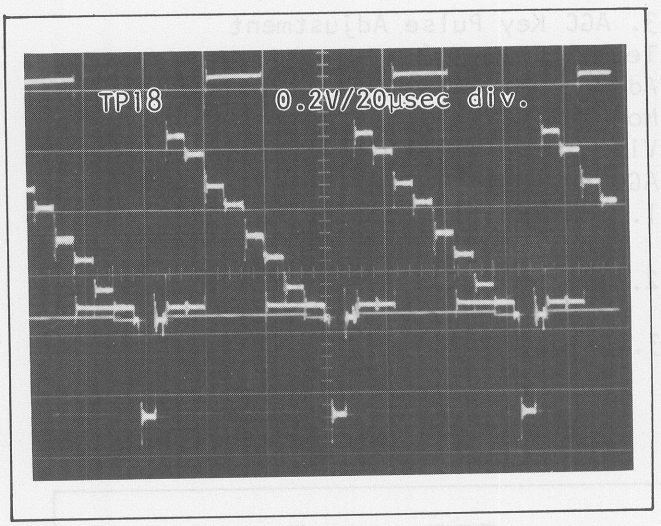


Fig. E31-b

4. Next, supply a Video Sweep signal with sync to the video input on the rear panel.
5. Connect the scope (10:1 Probe) to TP2 on the Video Recording C.B.A. (VEP0385A1).
6. Adjust Y. FREQ RESPONSE (R86) and (C33) so that the envelope from 0 to 3 MHz becomes flat as shown in Fig. E32.

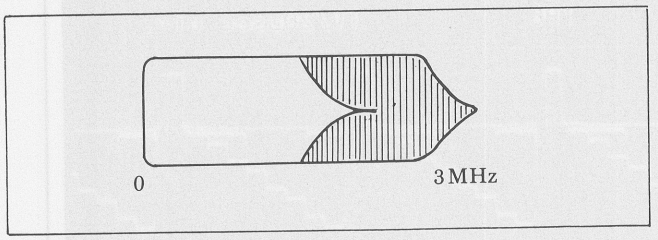


Fig. E32-a

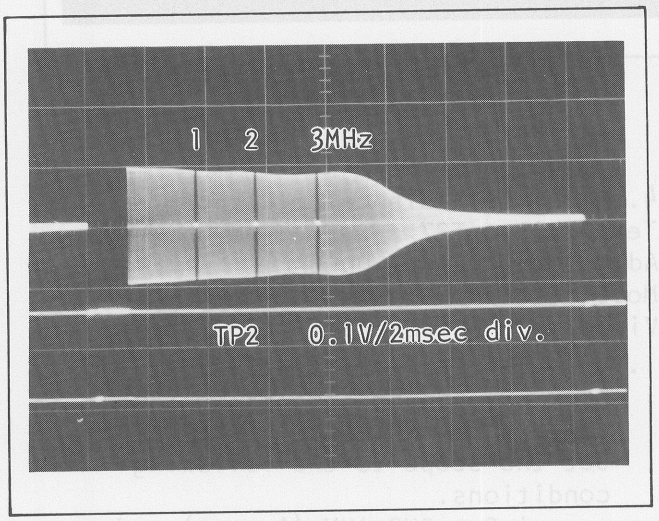


Fig. E32-b

3-3. AGC Key Pulse Adjustment
Test Point: TP6
Adjustment: R111 (AGC PULSE LEVEL)
Mode: STOP
Video Mode Selector: Color
AGC Switch: AGC

1. Connect the scope to TP6 on the Video Recording C.B.A. (VEP0385A1).
2. Supply a color bar signal to the Video Input on the rear panel.
3. Adjust AGC PULSE LEVEL (R111) so that the AGC pulse level becomes 3 times the sync amplitude as shown in Fig. E33.

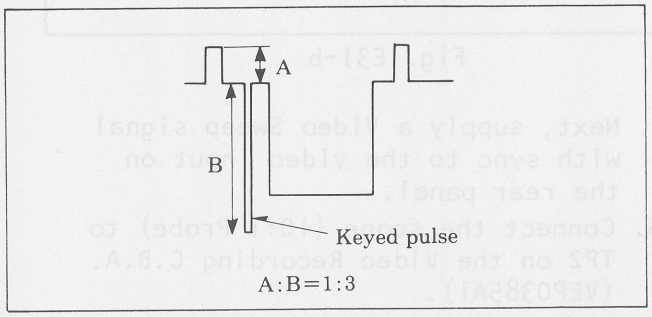


Fig. E33-a

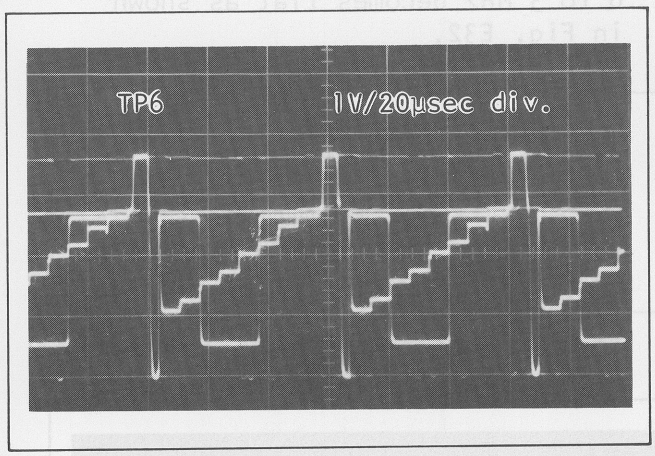


Fig. E33-b

3-4. Modulator Balance Adjustment
Test Point: TP7
Adjustment: R50 (MOD BAL)
Mode: STOP
Video Mode Selector: B/W

1. Connect the scope (for calibration) both CH1 and CH2 to TP7 on the Video Recording C.B.A. (VEP0385A1). Set the scope to the following conditions.
   * Set CH2 INV (invert) mode
   * TRIGGER: NORMAL
   * H = 0.1 μs and X5 mode
2. Adjust the level and positions of waveform image so that CH1 and CH2 are overlapped each other.
3. Adjust MOD BAL (R50) so that T becomes minimum as shown in Fig. E34.

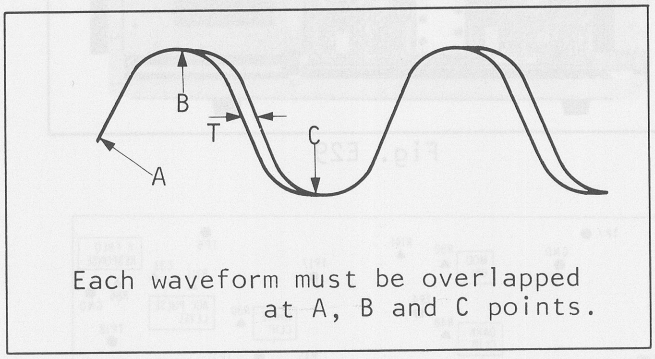


Fig. E34-a

Fig. E34-b

3-5. Clamp Deviation Adjustment
Test Point: TP7 (Y-PB)
Adjustment: R45, R141
Mode: STOP
Video Mode Selector: Color
AGC Switch: AGC

1. Connect the scope to TP7 on the Video Playback C.B.A. (VEP0386B1) with a 1:1 probe.
2. Supply a Color bar signal to the Video Input on the rear panel.
3. Turn R30 and R48 on the Video Recording C.B.A. (VEP0385A1) fully counterclockwise.
4. Supply a 3.8 MHz sine wave signal at -40 dB (0.028 Vp-p) to TP1 on the Video Playback C.B.A. (VEP0386B1). Set the frequency precisely with a frequency counter.

5. Adjust CLAMP (R45) on the Video Recording C.B.A. so that the beat on the sync tip portion is minimized as shown in Fig. E35.

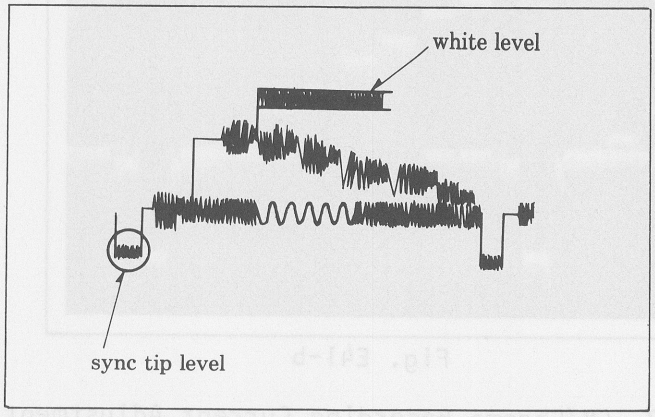


Fig. E35-a

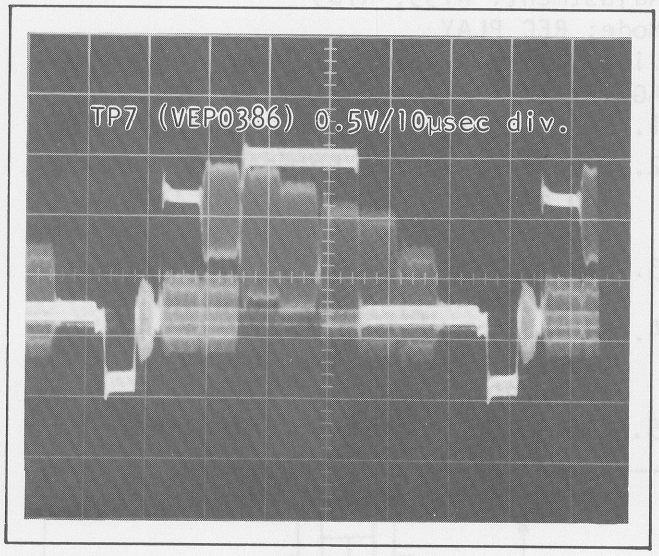


Fig. E35-b

6. Next reset the oscillator to supply a 5.4 MHz sine wave signal at -40 dB (0.028 Vp-p) to TP1 on the Video Playback C.B.A. (VEP0386B1). Set the frequency precisely with a frequency counter.

7. Adjust DEVIATION (R141) on the Video Recording C.B.A. (VEP0385A1) so that the beat on the white peak portion of the waveform is minimized as shown in Fig. E35.

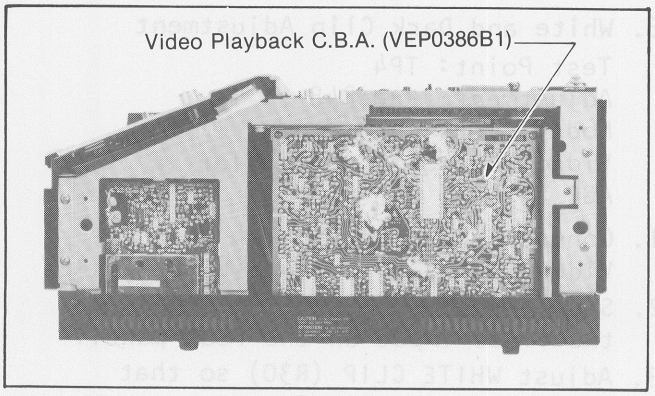


Fig. E36

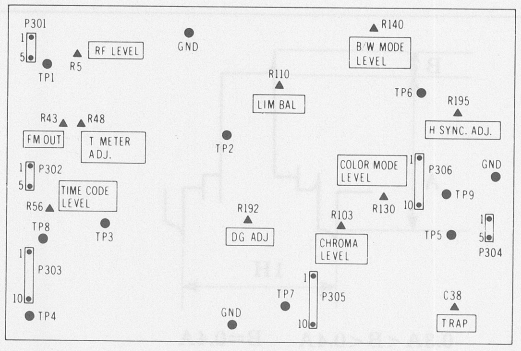


Fig. E37 : Video Playback C.B.A. (VEP0386B1)

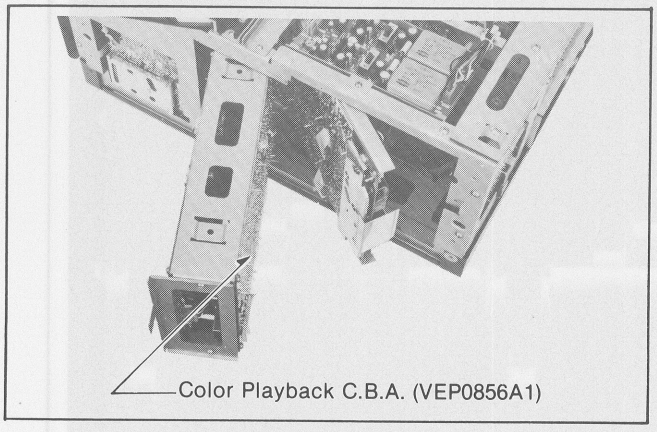


Fig. E38

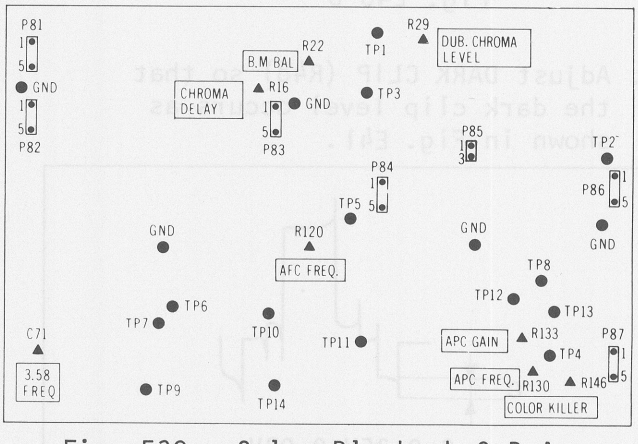


Fig. E39 : Color Playback C.B.A. (VEP0856A1)

3-6. White and Dark Clip Adjustment

Test Point: TP4
Adjustment: R30,R48
Mode: STOP
Video Mode Selector: Color
AGC Switch: AGC

1. Connect the scope to TP4 on the Video Recording C.B.A. (VEP0385A1).
2. Supply a color bar signal to the Video Input on the rear panel.
3. Adjust WHITE CLIP (R30) so that the white clip level occurs as shown in Fig. E40.

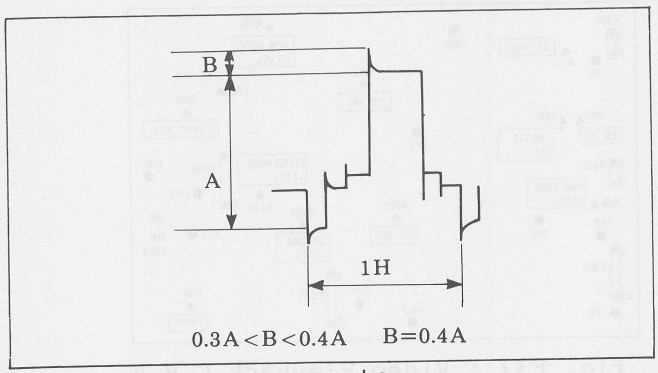


Fig. E40-a

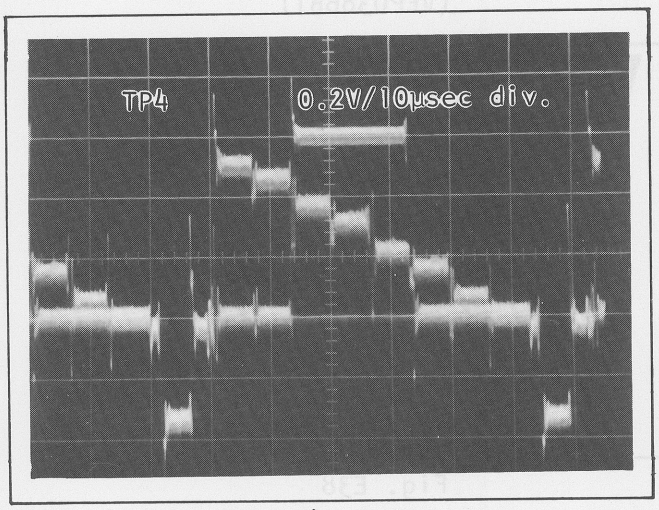


Fig. E40-b

4. Adjust DARK CLIP (R48) so that the dark clip level occurs as shown in Fig. E41.

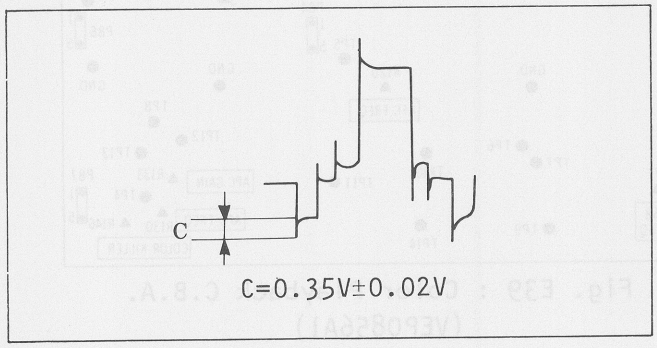


Fig. E41-a

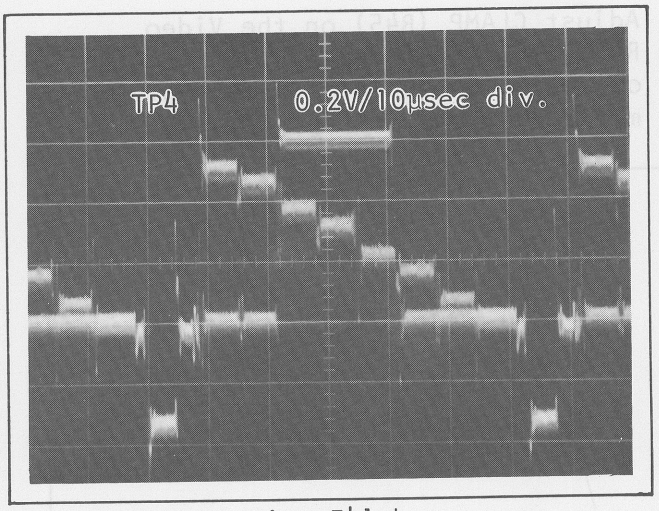


Fig. E41-b

3-7. FM/Chroma Recording Current Adjustment

Test Point: TP1, TP2 (GND) (VEP0539A)
Adjustment: R195, R169
Mode: REC PLAY
Video Mode Selector: Color
AGC Switch: AGC

1. Disconnect the short jumper of CP1.
2. Connect a jumper between TP5 and TP8 on the Video Recording C.B.A. (VEP0385A1).
3. Supply a color bar signal to the Video Input on the rear panel.
4. Connect the scope to TP1 and TP2 (ground side) on the Head Amp C.B.A. (VEP0539A).
5. Place the unit in Rec/Play mode.

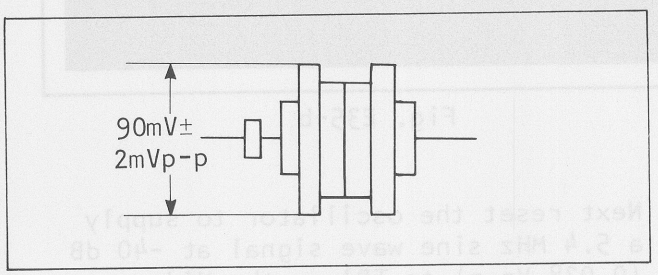


Fig. E42-a

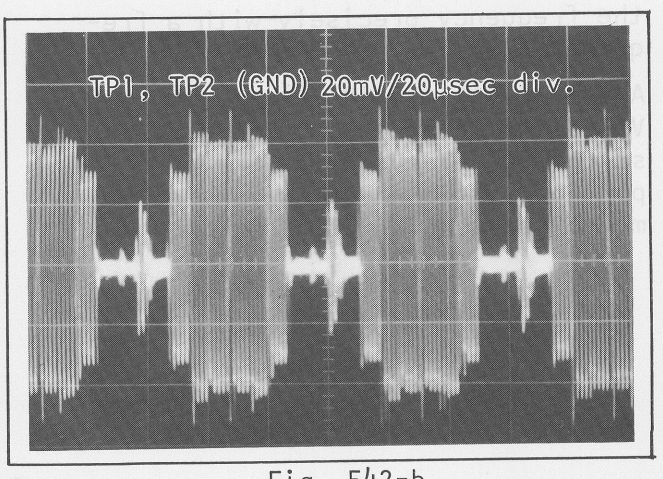


Fig. E42-b

6. Adjust chroma current R195 so that the cyan level becomes 90 mV ± 2 mVp-p as shown in Fig. E41.
7. Remove the TP5 to TP8 jumper.
8. Adjust FM current R169 so that the A becomes 470 mV ± 5 mVp-p as shown in Fig. E43.

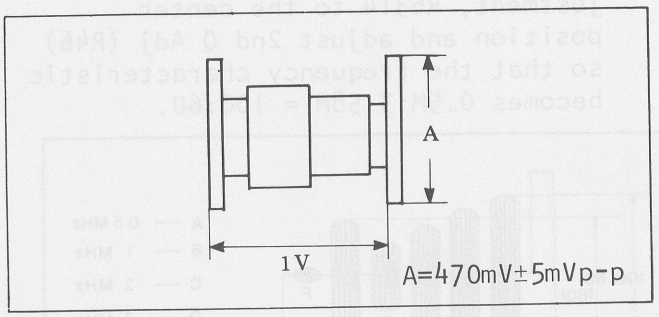


Fig. E43-a

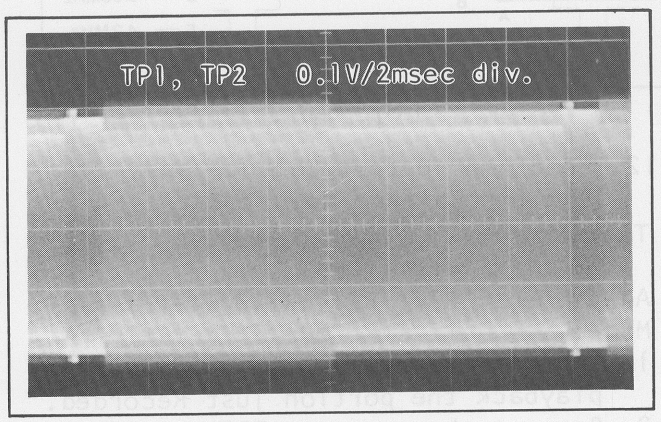


Fig. E43-b

9. Connect the short jumper CP1.

3-8. DUB. Chroma Recording Current Adjustment

Test Point: TP1, TP2, GND, (VEP0539A)
Adjustment: R187
Mode: REC PLAY
Video Mode Selector: Color
Input Selector: DUB

1. Connect a jumper between TP5 and TP8 on the Video Recording C.B.A. (VEP0385A1).
2. Open CP1 if not now open.
3. Connect 7 pin dubbing cable between the unit and a source Deck which is properly adjusted for chroma DUB Output level. (0.9 Vp-p, See 3-25).
4. Connect the scope to TP1 and TP2 (ground) on the Head Amp C.B.A. (VEP0539A).
5. Adjust DUB Current R187 so that the amplitude becomes 90 mVp-p as shown in Fig. E44.

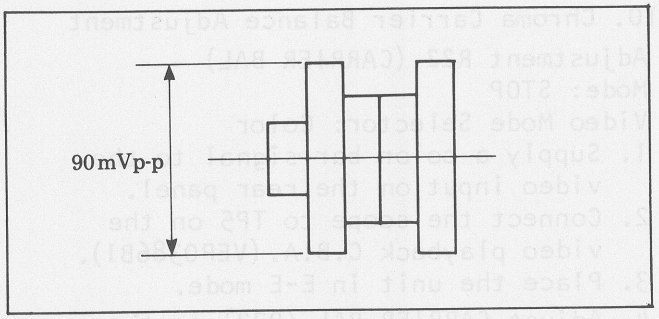


Fig. E44-a

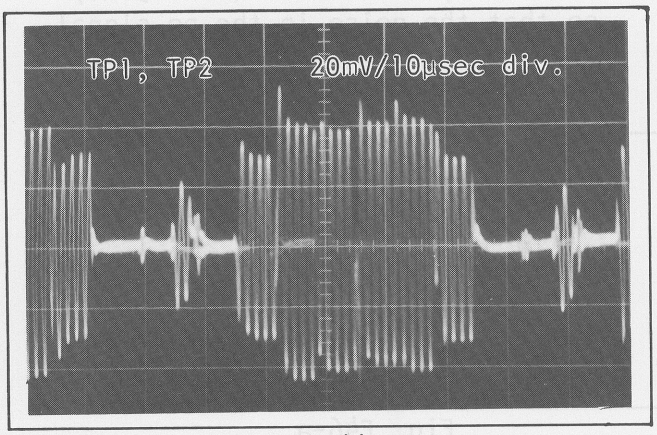


Fig. E44-b

6. After adjusting R187, reconnect CP1 and remove the TP5 to TP8 jumper.

3-9. H. Sync Width Adjustment

Test Point: P306-(7)
Adjustment: R195
Mode: STOP

1. Supply a color bar signal to the video input on the rear panel.
2. Connect the scope to P306-(7) on the video playback C.B.A. (VEP0386B1).
3. Adjust PULSE WIDTH R195 on the playback circuit (VEP0386B1) so that the H. pulse width becomes 4.5 μs as shown in Fig. E45.

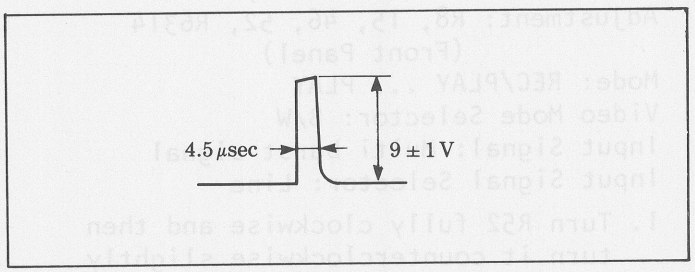


Fig. E45

3-10. Chroma Carrier Balance Adjustment

Adjustment R22 (CARRIER BAL)
Mode: STOP
Video Mode Selector: Color

1. Supply a color bar signal to the video input on the rear panel.
2. Connect the scope to TP5 on the video playback C.B.A.(VEP0386B1).
3. Place the unit in E-E mode.
4. Adjust CARRIER BAL (R22) on the Color Playback C.B.A. (VEP0856A1) so that the noise in the no signal portions of the chroma signal becomes minimum as shown in Fig. E46.

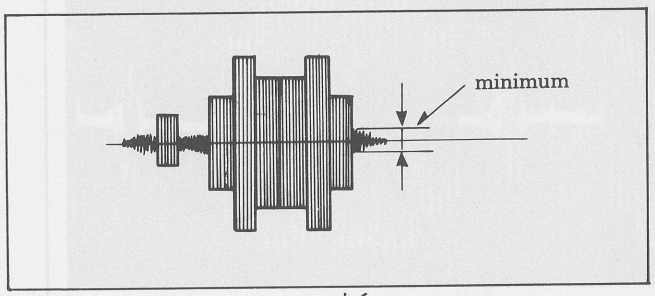


Fig. E46-a

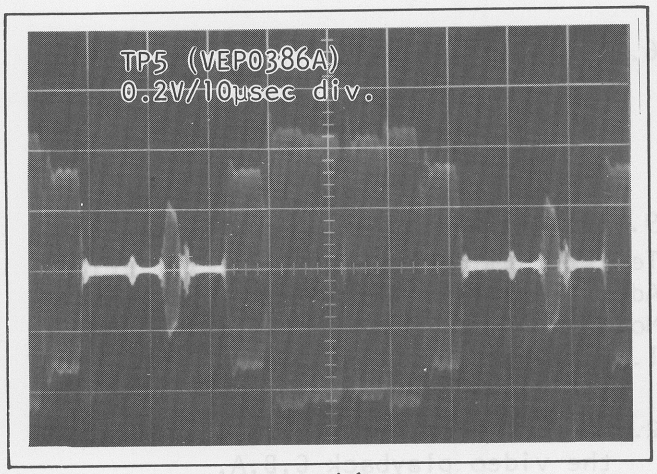


Fig. E46-b

3-11. Head Amp. Frequency Characteristics Adjustment

Test Point: TP6 (Video-PB)
Adjustment: R8, 15, 46, 52, R6314 (Front Panel)
Mode: REC/PLAY ... PLAY
Video Mode Selector: B/W
Input Signal: Multi burst signal
Input Signal Selector: Line

1. Turn R52 fully clockwise and then turn it counterclockwise slightly.
2. Turn R5 fully (Video-PB) and R46 (Head Amp) both fully clockwise.
3. Record a multi burst signal for a while and then playback the portion just recorded.
4. Adjust Q. Adj (R8) and (R15) so that the frequency characteristic becomes 0.5M:3.58M = 100:80.
5. Set the Q control front panel adjustment, R6314 to the center position and adjust 2nd Q Adj (R46) so that the frequency characteristic becomes 0.5M:3.58M = 100:60.

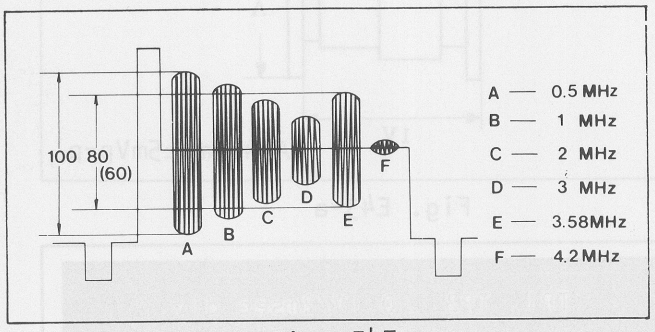


Fig. E47

3-12. Head Amp. Output Balance and Limiter Balance Adjustment

Test Point: TP5, TP1 (C-PB), TP6 (Y-PB)
Adjustment: R37, R21, R110 (Y-PB)
Mode:

1. Record a color bar signal and then playback the portion just Recorded.
2. Connect the scope to TP5 on the Head Amp. C.B.A. (VEP0539A).
3. Adjust FM MIX, R37 so that the luminance level from each channel matches as shown in Fig. E48.

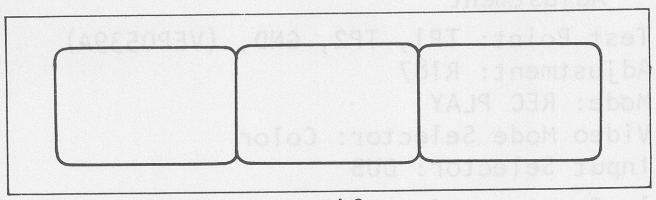


Fig. E48-a

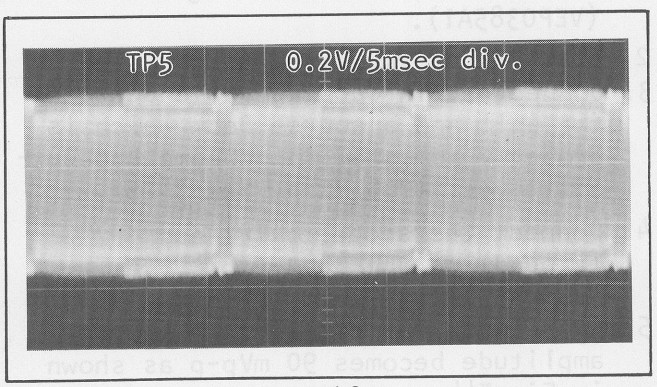


Fig. E48-b

4. Transfer the scope to TP1 on the Head Amp. C.B.A. (VEP0539A).
5. Adjust Chroma MIX, R21 so that the chroma level of each channel matches as shown in Fig. E49.

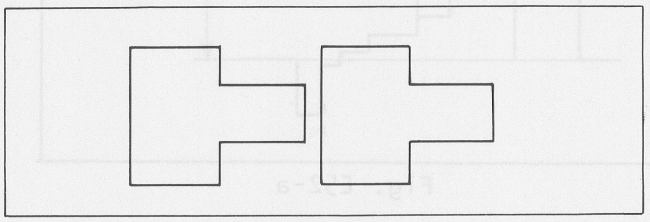


Fig. E49-a

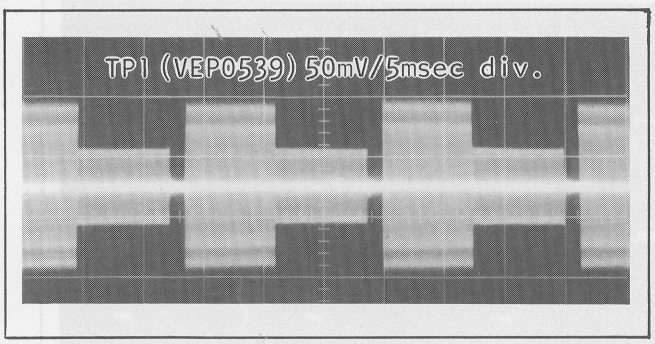


Fig. E49-b

6. Transfer the scope to TP6 on the Video Playback C.B.A. (VEP0386B1).
7. Adjust LIM BAL (R110) so that the carrier leak becomes minimum.

3-13. 4.27 MHz Oscillator Adjustment

Test Point: TP9 (Video REC)
Mode: STOP
Input Selector: LINE
Adjustment: C72

1. Connect the counter to TP9 on the Video Recording C.B.A. (VEP0385A1).
2. Adjust 4.27 OSC, C72 so that the frequency becomes 4.267935 MHz ± 5 Hz.

3-14. 3.58 MHz Oscillator Adjustment

Test Point: TP7 (C-PB)
Mode: STOP
Video Mode Selector: Color

1. Connect the counter to TP7 on the Color Playback C.B.A. (VEP0856A).
2. Adjust 3.58 OSC, C71 so that the frequency becomes 3.579545 MHz ± 5 Hz.

3-15. AFC Oscillator Adjustment

Test Point: TP10 (Color Playback)
Adjustment: R120
Mode: Tapeless Playback

1. Supply +12 V to pin 27 of IC5 on the Color Playback C.B.A. through 100 kΩ.
2. Connect a jumper between TP9 on the Video Playback C.B.A. (VEP0386B1) and ground.
3. Connect the counter to TP10 on the Color Playback C.B.A. (VEP0856A).
4. Place the unit in play mode without tape running.
5. Adjust AFC FREQ. R120 so that the frequency becomes 409.1 ± 0.4 kHz.
6. After adjustment, remove the resistor and the jumper.

3-16. APC Oscillator Adjustment (C-PB)

Test Point: Video Output
Adjustment: R130
Mode: PLAY
Video Input Selector: LINE

1. Playback the Recorded Reference Tape (VFM2081D) (NTSC Color bars portion)
2. Adjust APC FREQ (R130) on the Color Playback C.B.A. so that the playback video color burst crawls as slowly as posible through the display or the waveform monitor, as shown in Fig. E50.

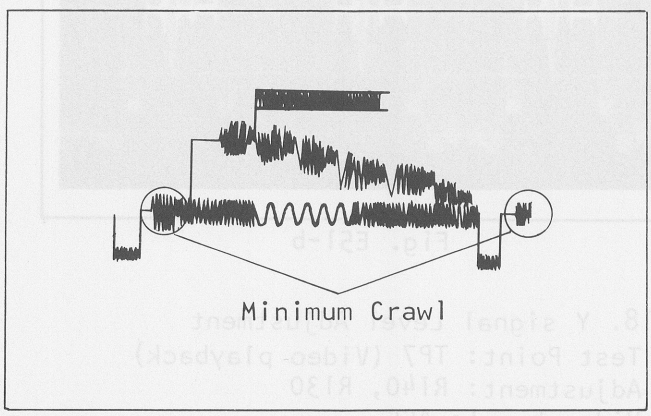


Fig. E50

3-17. 4.96 MHz Trap Adjustment

Test Point: TP5 (Video playback)
Adjustment: C38
Video Mode: Color
Mode: STOP

1. Supply a color bar signal to the Video Input on the rear panel.
2. Connect the scope to TP5 on the Video Playback C.B.A.(VEP0386B1).
3. Adjust 4.96 TRAP (C38) so that the beat on the chroma signal becomes minimum as shown in Fig. E51.

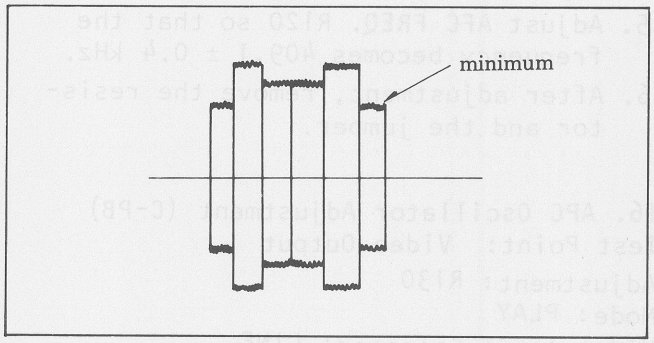


Fig. E51-a

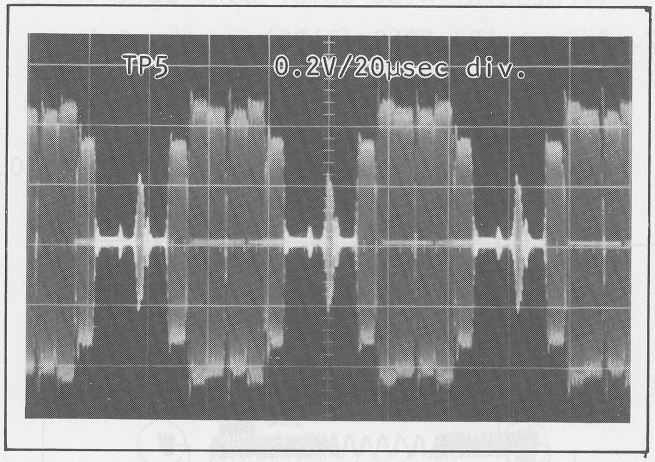


Fig. E51-b

3-18. Y signal Level Adjustment

Test Point: TP7 (Video playback)
Adjustment: R140, R130
Video Level: AGC
Mode: STOP

1. Supply a color bar signal to the Video Input on the rear panel.
3. Set the Video Mode in B/W and adjust B/W MODE LEVEL (R140) so that the Y signal becomes 2 Vp-p as shown in Fig. E52.

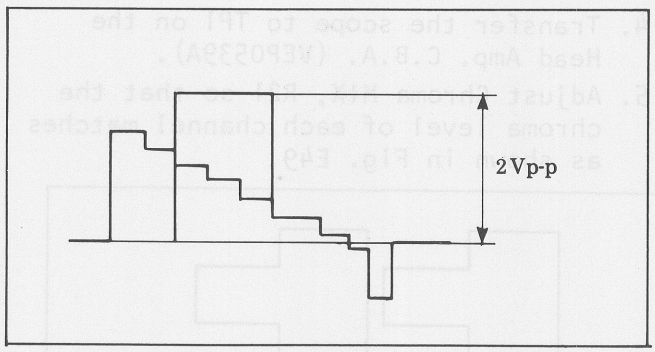


Fig. E52-a

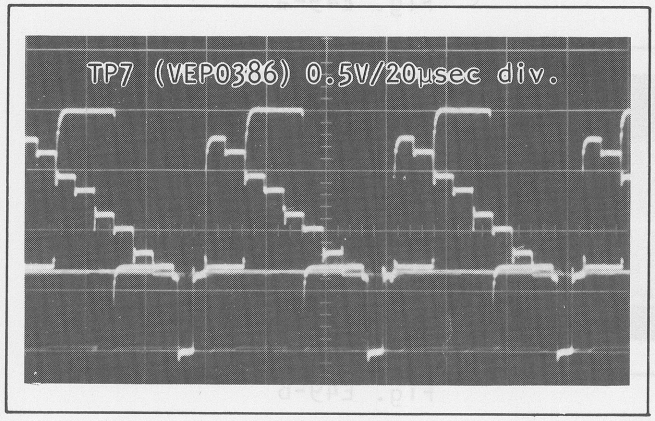


Fig. E52-b

4. Change the Video Mode to color and Adjust C MODE R130 so that Composite signal becomes 2 Vp-p as shown in Fig. E53.

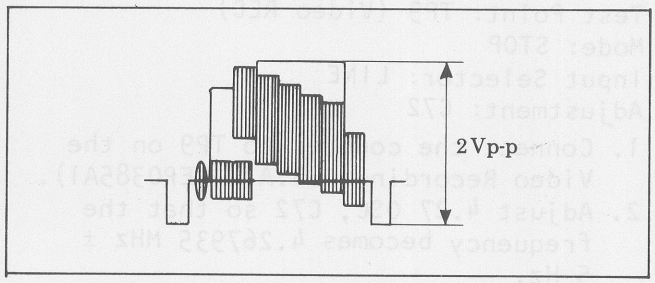


Fig. E53-a

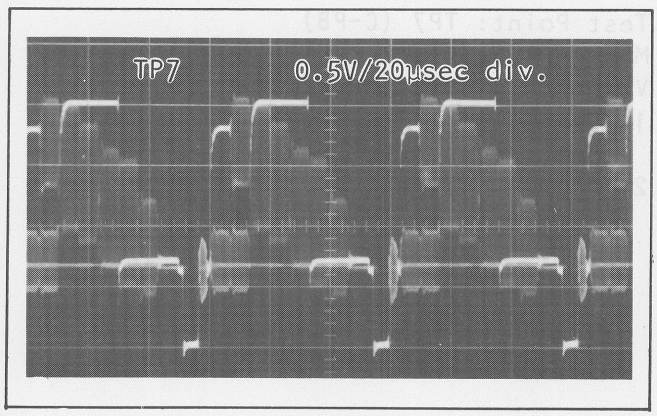


Fig. E53-b

3-19. REC Mode Color Killer Adjustment

Test Point: TP15
Adjustment: R217
Mode: STOP
Video Mode: AUTO
Refer to page 2-43 Item B)

1. Supply a color bar signal to the Video Input on the rear panel.
2. Adjust Color Killer R217 so that the DC voltage at TP5 on the Video Recording C.B.A. (VEP0385A1) becomes 11 V.
3. Confirm that color Killer performs when a monochrome signal is supplied to the Video Input on the rear panel.

3-20. Playback Mode Color Killer Adjustment

Test Point: TP13
Adjustment: R146
Mode: E-E

1. Supply a color bar signal to the video input on the rear panel and set the unit E-E mode.
2. Connect a jumper wire between TP8 and TP12 both on the Color Playback C.B.A. (VEP0856A).
3. Connect a scope to TP13 on the same board.
4. Adjust Color Killer (R146) so that the signal level becomes 0.95 ∿ 1.0 V DC.
5. Disconnect the jumper wire.

3-21. Bias Trap Adjustment

Test Point: TP6 (Head Amp C.B.A.)
Adjustment: L5
Mode: STOP

1. Connect the scope to TP6 on the Head Amp.
2. Supply a 75 kHz (20 mVp-p measured at no load) to TP3 on the same circuit board.
3. Adjust Bias Trap L5 so that the 75 kHz signal at TP6 becomes minimum as shown in Fig. E54.

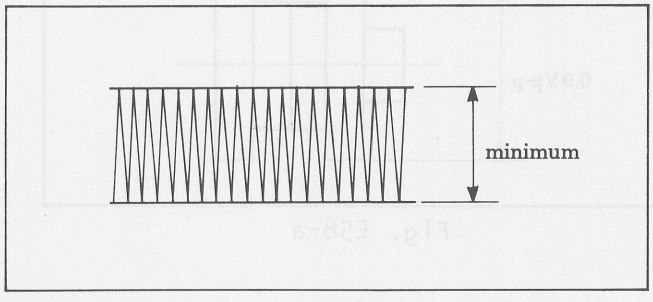


Fig. E54-a

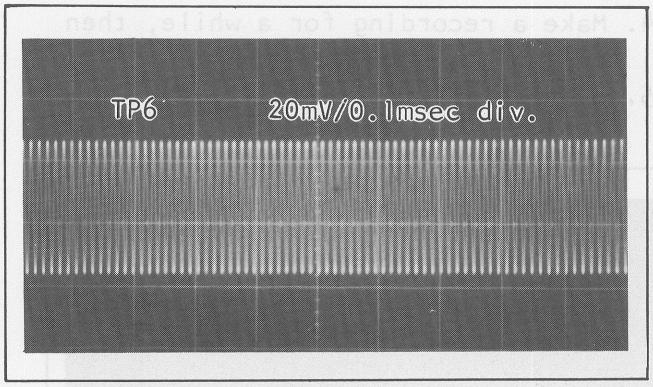


Fig. E54-b

3-22. Differential Gain Adjustment

Test Point: Video Out
Adjustment: R192
Mode: E-E, V-V

1. Supply a modulated Stair Step signal (ramp signal with sub carrier) to the video input on the rear panel.
2. Connect the vector scope to the video output on the rear panel, and set the vector scope to the DG mode.
3. Adjust DG (R192) or the Video Playback C.B.A. (VEP0386B1) for minimum differential gain as shown in Fig. E55.

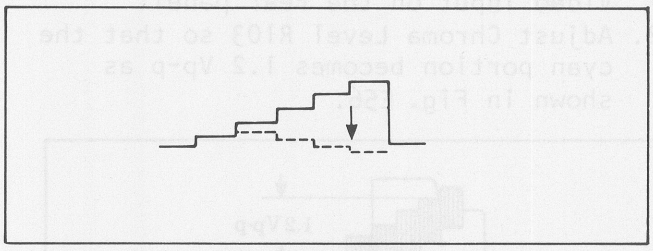


Fig. E55-a

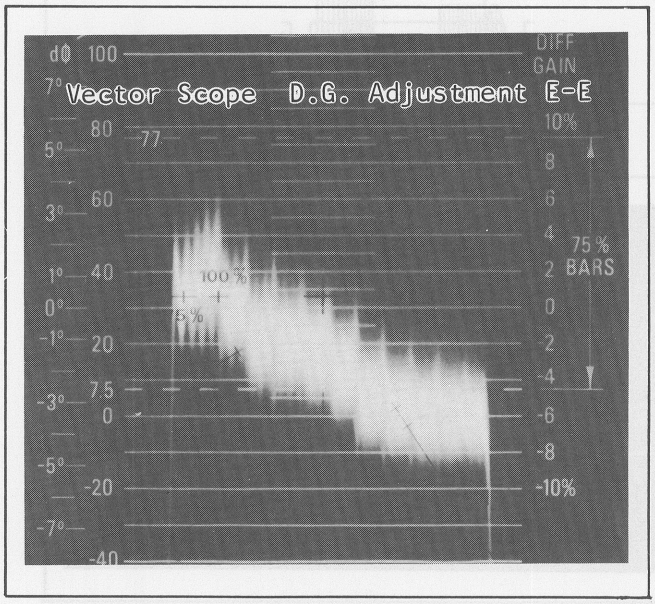


Fig. E55-b

4. Make a recording for a while, then playback the portion just recorded.
5. Confirm the DG is within ±10% with vector scope as shown in Fig. E55-c.

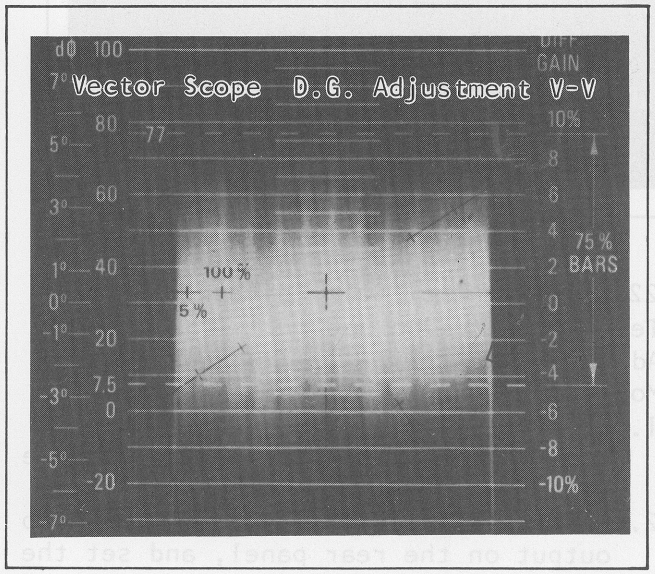


Fig. E55-c

3-23. Chroma Level Adjustment
Test Point: TP7 (Video Playback)
Adjustment: R103
1. Supply a color bar signal to the Video Input on the rear panel.
2. Adjust Chroma Level R103 so that the cyan portion becomes 1.2 Vp-p as shown in Fig. E56.

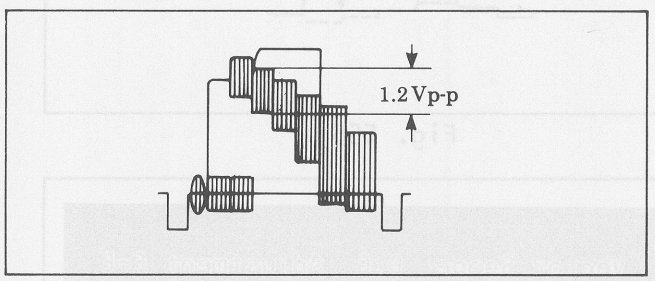


Fig. E56-a

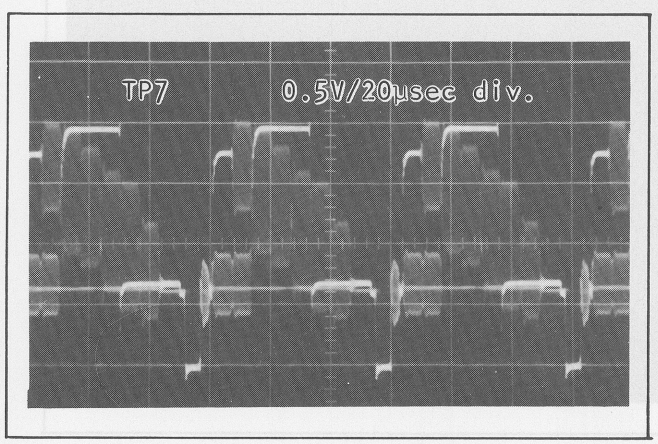


Fig. E56-b

3. Confirm that the chroma level will change more than 10% by rotating the front panel Chroma Level Control, R6313. Reset it to the detent position.

3-24. Y/C Delay time Adjustment
Test Point:Video output
Adjustment:R16
Mode :REC/Play ➡ Playback

1. Supply a $\sin^2$ wave signal to the video input on the rear panel.
2. Make a recording for a while and then playback the portion just recorded.
3. Observe the modulated 20T pulse portion and Adjust R16 (Y.C. DELAY) so that A Portion of the waveform becomes flat as shown in Fig E57.

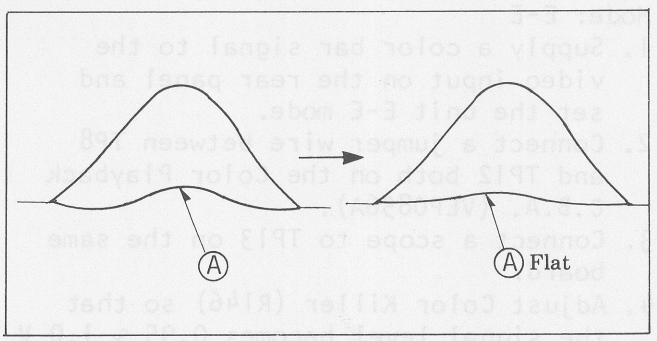


Fig. E57

3-25. Chroma DUB Out Level Adjustment
Test Point: TP2 (Chroma Playback)
Adjustment: R29
Mode: STOP
1. Supply a Color bar signal to the Video Input on the rear panel.
2. Connect the scope to TP2 on the Color Playback C.B.A. (VEP0856A).
3. Adjust DUB CHROMA LEVEL (R29) so that the cyan level becomes 0.9 Vp-p as shown in Fig. E58.

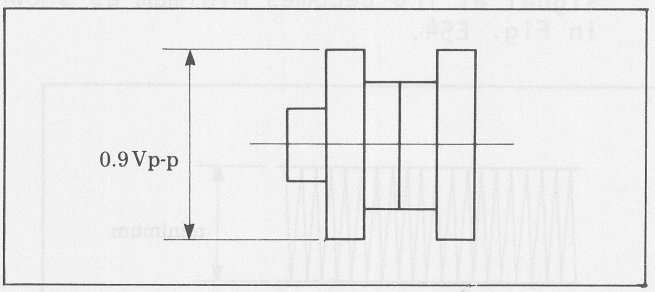


Fig. E58-a

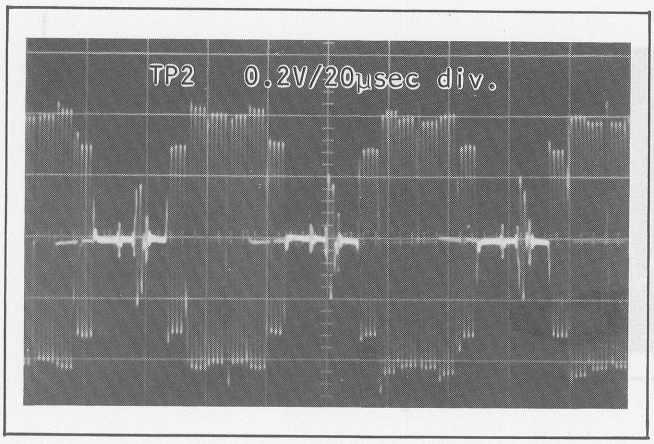


Fig. E58-b

3-26. FM Out Level and Tracking Meter Adjustment

Test Point: P302-4 (Video Playback)
Adjustment: R43 (FM Out), R48
Mode: REC/PLAY→PLAY

1. Supply a Color bar signal to the Video Input on the rear panel.
2. Make a recording for a while and then playback the portion just recorded.
3. Adjust FM OUT (R43) so that the FM envelope at P302 pin 4 on the Video Playback C.B.A. (VEP0386B1) becomes 1.0 Vp-p as shown in Fig. E59. (J6311, RF out on the rear panel may also be used.)

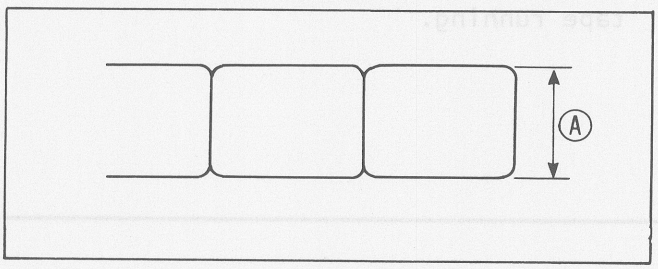


Fig. E59-a

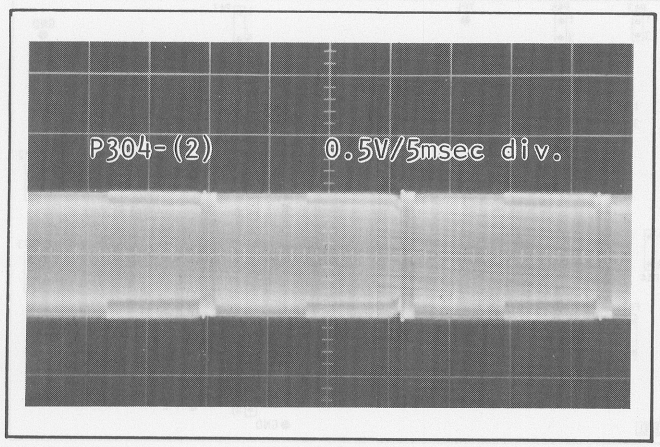


Fig. E59-b

4. Adjust Tracking METER ADJ, R48 so that the tracking meter indicates 3.5 as shown in Fig. E60, when the tracking control is in the detent position.

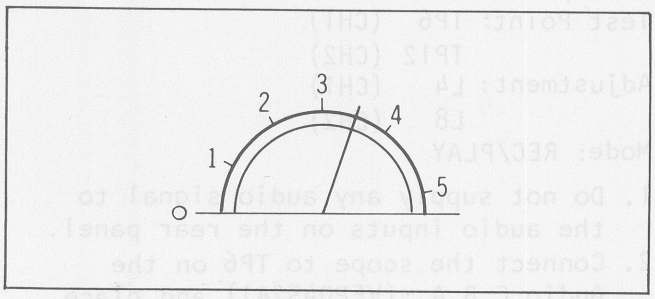


Fig. E60

3-27. Time Code Gate Pulse Adjustment

Test Point: TP3, P303-(1) (Video Playback)
Adjustment: R56

1. Connect the scope to TP3 on the Playback C.B.A. (VEP0386B1).
2. Playback a tape with the Time Code signal recorded in the time code address track.
3. Adjust TIME CODE LEVEL R56 so that the level becomes 3Vp-p.
4. Transfer the scope to P303-(1) from TP3 and confirm that the time code pulse is shown in Fig. E61.

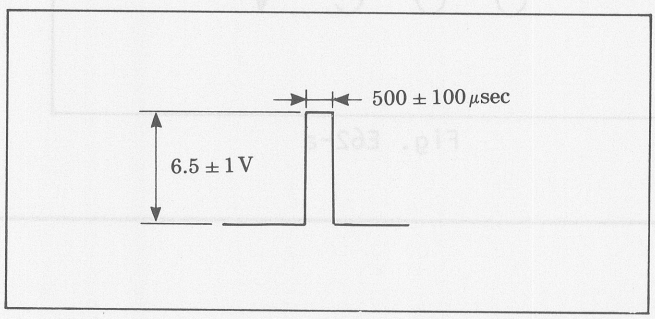


Fig. E61

4. Audio Circuit

4-1. Bias Trap Adjustment of Audio Rec. Amp.

Test Point: TP6 (CH1)
TP12 (CH2)
Adjustment: L4 (CH1)
L8 (CH2)
Mode: REC/PLAY

1. Do not supply any audio signal to the audio inputs on the rear panel.
2. Connect the scope to TP6 on the Audio C.B.A. (VEP0452A1) and place the unit in Rec mode with tape running.
3. Adjust BIAS TRAP, L4, so that the voltage becomes minimum, 5Vp-p or less.
4. Then connect the scope to TP12 on the same Circuit Board.
5. Adjust BIAS TRAP, L8, so that the voltage also becomes minimum, 5Vp-p or less.

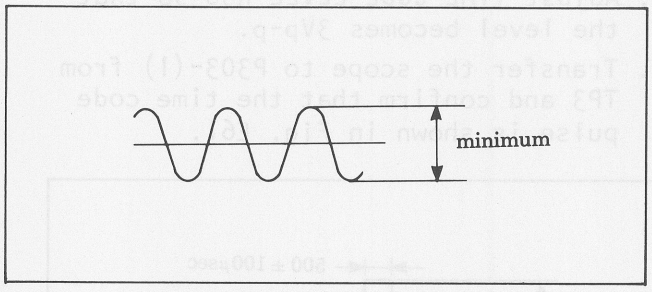


Fig. E62-a

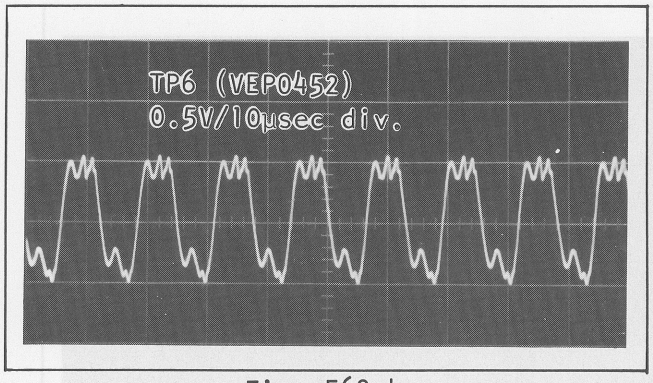


Fig. E62-b

4-2. Recording Equalizing Adjustments

Test Point: TP6 (CH1)
TP12(CH2)
Adjustment: L3 (CH1)
L7 (CH2)
Mode: REC/PLAY

1. Place the unit in the Stop Mode. Connect TP16 and TP17 on the Audio C.B.A. (VEP0452A1) to ground with jumper cables.
2. Connect the scope to TP6 on the same board.
3. Supply a 17 kHz sine wave signal at -40 dB (0.028 Vp-p) to the audio input jack CH1 on the rear panel and set the Input Selector on the front panel to the Line mode. Place the unit in the Rec mode with tape running.

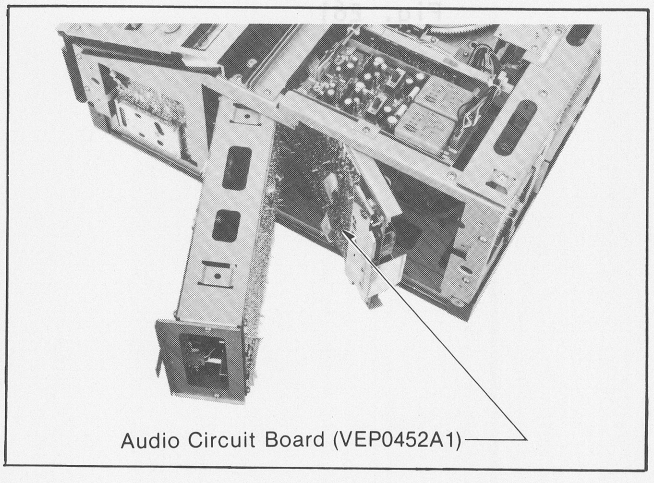


Fig. E63

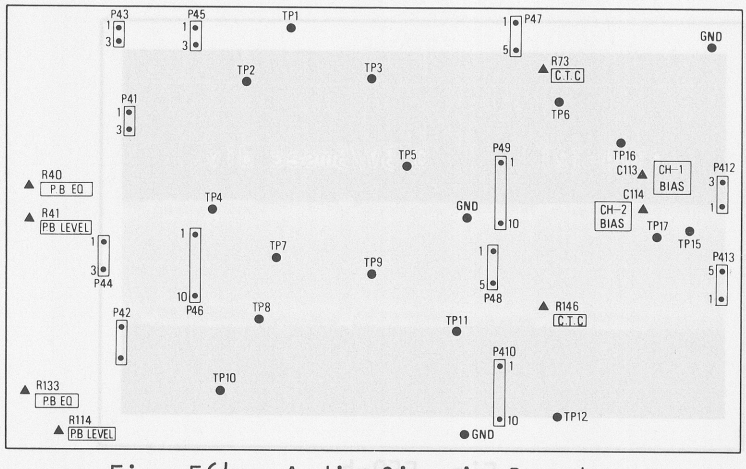


Fig. E64 : Audio Circuit Board (VEP0452A1)

4. Adjust Recording E.Q, L3 so that the voltage becomes a maximum, 5.4Vp-p or more.
5. Now connect the scope to TP12 on the same board and supply a 17KHZ sine wave signal at -40 dB (0.028Vp-p) to the audio input jack CH2 on the rear panel.
6. Adjust Recording E.Q, L7 so that the voltage becomes a maximum 5.4Vp-p.
7. Remove the jumper cables from TP16 and TP17.

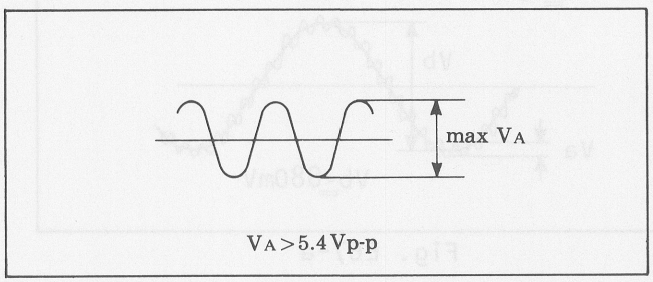


Fig. E65-a

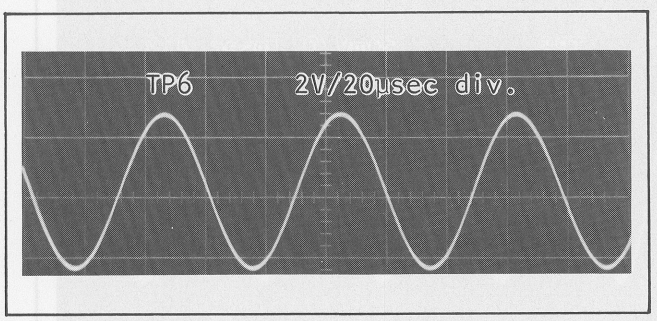


Fig. E65-b

4-3. Bias Trap Circuit Adjustment

Test Point: TP5 (CH1)
TP11 (CH2)
Adjustment: L2 (CH1)
L6 (CH2)

1. Connect the scope to TP5 on the Audio C.B.A. (VEP0452A1).
2. Do not supply any signal to the rear panel.
   Place the unit in the Rec mode with tape running.
3. Adjust BIAS TRAP, L2 so that the noise becomes a minimum.
   Now connect the scope to TP12 on the same board.
4. Adjust BIAS TRAP, L6 so that the noise becomes a minimum.

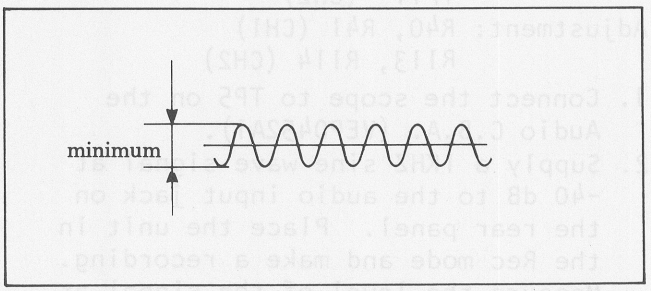


Fig. E66-a

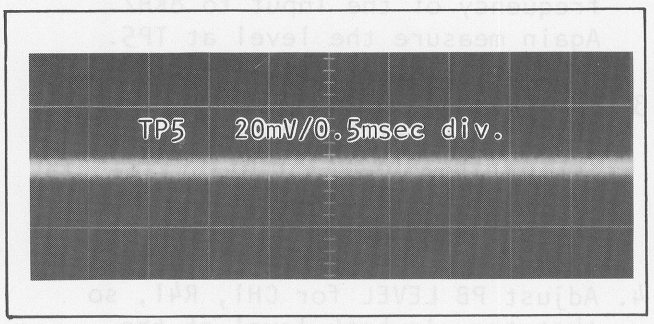


Fig. E66-b

4-4. Recording Bias Current Adjustment

Test Point: P41 (CH1)
P42 (CH2)
Adjustment: C113 (CH1)
C114 (CH2)

1. Do not supply any audio signal to the audio inputs on the rear panel.
2. Connect a VTVM across the 10 Ω resistor, R6347 on the audio head attachment P.C.Board (VJB0050) and place the unit in the Rec mode with the tape running.
3. Adjust CH1 Bias Adj. C113, on the Audio C.B.A. (VEP0452A1) so that the voltage is 6 mV.
4. Then, connect the VTVM across the 10 Ω resistor, R6348 on the audio head attachment P.C.Board (VJB00550) and put the unit in the Rec mode with tape running.
5. Adjust CH2 Bias Adj. C114 on the audio C.B.A. (VEP0452A1) so that the voltage is 6 mV.

4-5. Playback Equalizer and Playback Output Adjustment

Test Point: TP5 (CH1)
TP11 (CH2)

Adjustment: R40, R41 (CH1)
R113, R114 (CH2)

1. Connect the scope to TP5 on the Audio C.B.A. (VEP0452A1).
2. Supply a 1KHZ sine wave signal at -40 dB to the audio input jack on the rear panel. Place the unit in the Rec mode and make a recording. Measure the level of the signal at TP5 while recording. Now change the frequency of the input to 8KHZ. Again measure the level at TP5. Note both signal values.
3. Playback the portion just recorded and adjust CH1 PLAYBACK E.Q., R40 so that the level ratio of the 1 kHz signal and the 8 kHz signal are the same as was measured during recording.
4. Adjust PB LEVEL for CH1, R41, so that the playback level of the 1 kHz signal has the same during recording.
5. Connect the scope to TP11 on the same board, and supply a 1 kHz sine wave signal at -40 dB to the audio input jack CH2 on the rear panel.
6. Place the unit in the record mode and make a recording measure the voltage at TP11.
7. Change the frequency of the signal to 8KHZ and again measure the level at TP11.
8. Playback the tape and adjust CH2 PB E.Q. R114 and P.B. LEVEL for CH2, R114 as was done for CH1.

4-6. Bias Leak and Cross Talk Adjustment in the Insert Mode

Test Point: TP5 (CH1)
TP11 (CH2)

Adjustment: L1, R73 (CH1)
L5, R146 (CH2)

1. Connect the scope to TP11 on the Audio C.B.A. (VEP0452A1).
2. Supply a 5KHZ sine wave signal at -20 dB to each Audio Input (CH1 and CH2) on the rear panel.
3. Set the Insert Selector CH1 to ON and CH2 to OFF.
4. Play back a tape, then place the unit in the Insert Edit mode, by pushing EDIT and CUT IN at the same time.
5. Adjust CROSS TALK CANCEL R73 and BIAS TRAP L5 so that the cross talk and bias leak become minimum as shown in Fig E67.
6. Now connect the scope to TP5 on the same circuit board. Set the Insert Selector CH2 to ON and CH1 to OFF. Adjust CROSS TALK CANCEL R146 and BIAS TRAP, L1 so that the cross talk and bias leak become minimum as was done for CH1.

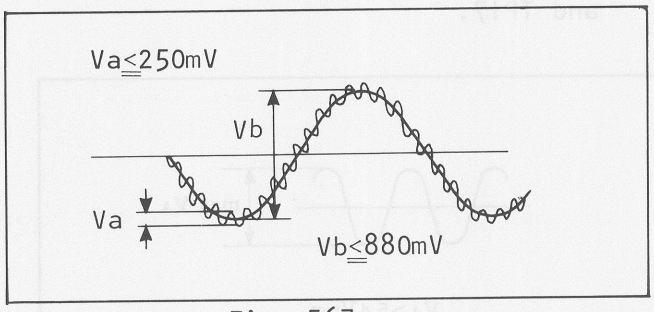


Fig. E67-a

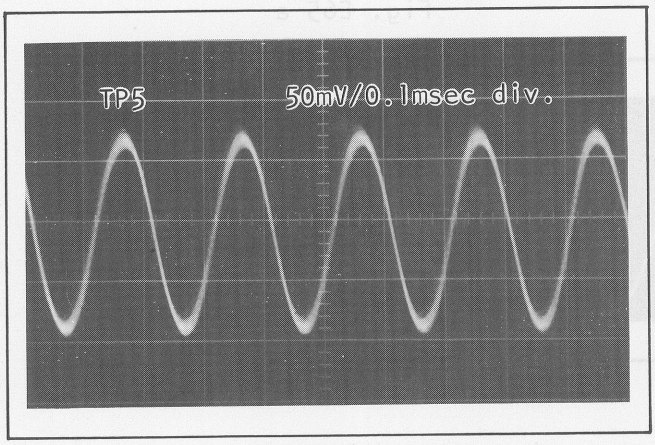


Fig. E67-b

4-7. Audio Pop Noise Confirmation

Test Point: TP5 (CH1)
TP11 (CH2)

Mode: Play→Insert

1. Do not supply any audio signal to the audio input on the rear panel.
2. Connect the scope CH1 to TP5 and CH2 to TP11 on the Audio C.B.A. (VEP0452A1).
3. Set the Audio Insert Selector to ON (CH1 and CH2).
4. Place the unit in the Playback mode.

5. Push the Edit and Cut In Button at the same time to place the unit in the Insert Edit mode. Then repeatedly alternate pushing the CUT OUT and EDIT/CUT IN buttons to place the unit in and out of the Insert mode several times.
6. At this time, make sure that the pop noise on the scope is 1Vp-p or less.
7. Then rewind the tape and play back the edited portion.
8. Make sure that the pop noise on the scope becomes 1Vp-p or less.

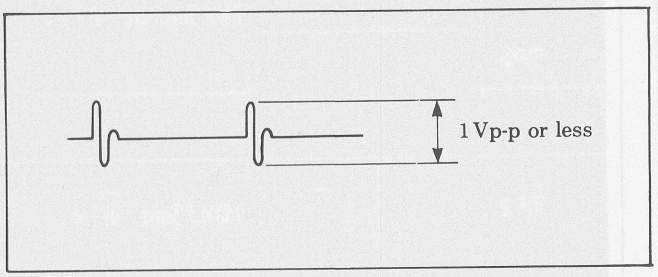


Fig. E68

4-8. Line Out Level Adjustment
Test Point: Audio Output 2, 3 on the rear panel.
Adjustment: R2, R13
Input Signal: 1kHz
Mode: E-E
Output Level SW: +4dB
1. Connect the VTVM to TP5 and TP11 on the Audio Circuit Board (VEP0452A1).
2. Adjust MAN. VR. R6333, R6334 on the front panel for 1 Vrms.
3. Adjust R2 and R13 so that the LINE OUT 2, 3 becomes +4dBm (1.23Vrms).
4. Change the Output level SW to the -20dB and confirm that the output level becomes -20dBm.
5. Set the output level SW to the +4dB.

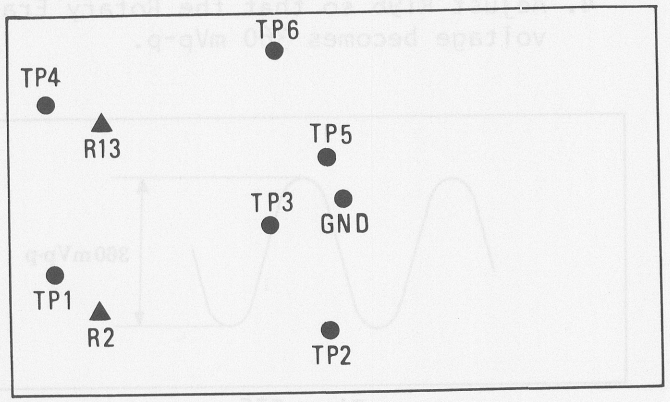


Fig. E69 Audio Line Out P.C. Board.

5. System Control Circuit

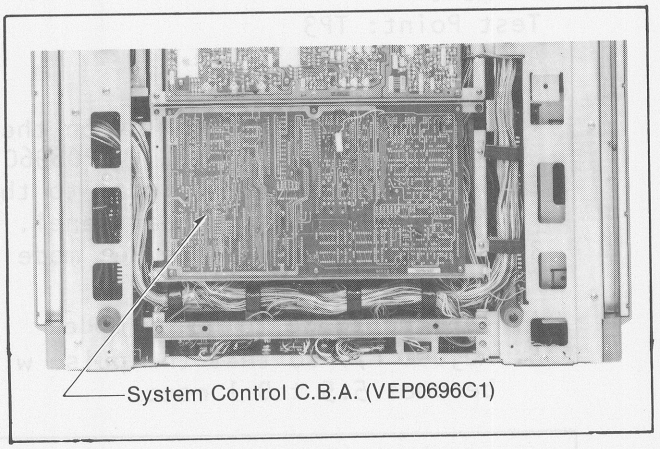


Fig. E70 : System Control C.B.A. (VEP0696C1)

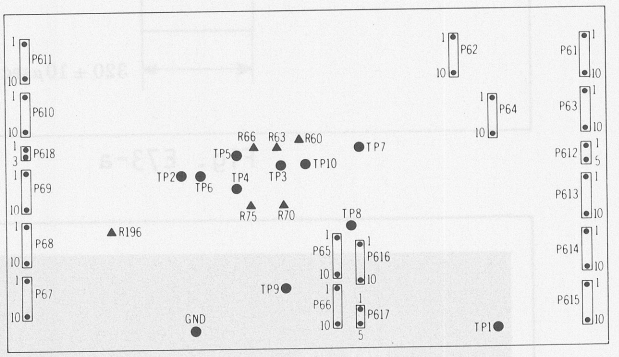


Fig. E71

5-1. +5 V DC Confirmation
Test Point: TP1
1. Connect the VTVM to TP1 on the System Control C.B.A. (VEP0696C1).
2. Confirm that the Voltage is +5V ± 0.1 V.

5-2. Flying Erase Timming Adjustment
Test Point: TP4
Adjustment: R70
Mode: REC/PLAY
1. Connect the scope to TP4 on the Transport Circuit Board (VEP0696C1)
2. Supply a color bar signal to the Video Input on the rear panel.
3. Place the unit in the Rec mode with tape running.

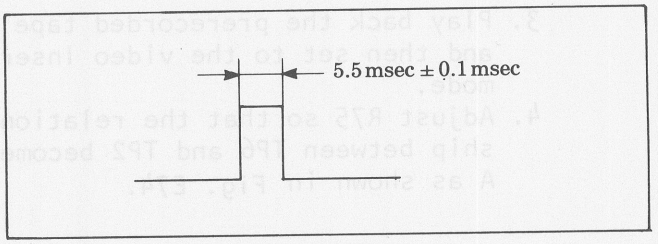


Fig. E72.

5-3. 5H REC Overlap Timming Pulse Adjustment

Test Point: TP3
Adjustment: R63
Mode: REC/PLAY

1. Connect the scope to TP4 on the System Control C.B.A. (VEP0696C1).
2. Supply a Color Bar signal to the Video Input on the rear panel.
3. Place the unit in the Rec mode with tape running.
4. set the scope to Delay mode.
5. Adjust R70 so that the pulse width becomes 5.5 ± 0.1 msec.

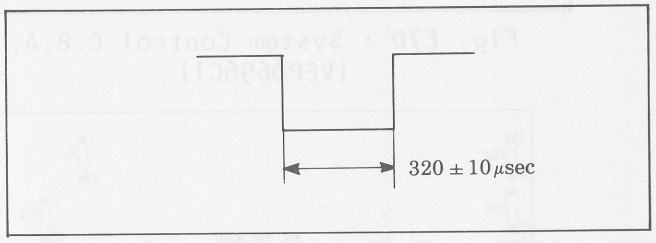


Fig. E73-a

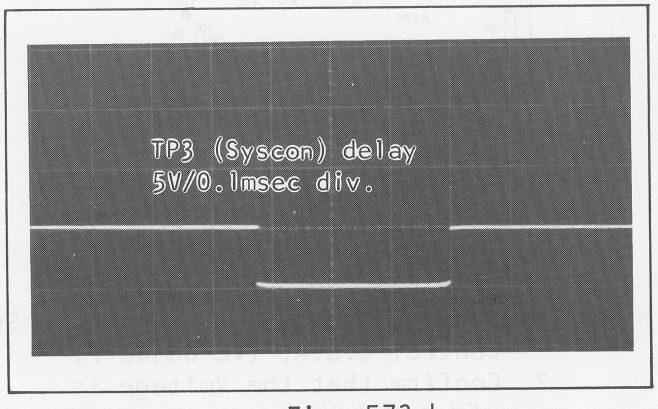


Fig. E73-b

5-4. T/C Jump Adjustment

Test Point: TP6, TP2 (VEP0696C1)
Adjustment: R66, R75
Mode: PLAY → VIDEO INSERT
Input Signal: Color Bar Signal

1. Supply a color bar signal to the video input connector on the Rear Panel.
2. Connect the scope CH1 to TP6 and CH2 to TP2.
3. Play back the prerecorded tape and then set to the video Insert mode.
4. Adjust R75 so that the relation ship between TP6 and TP2 becomes A as shown in Fig. E74.

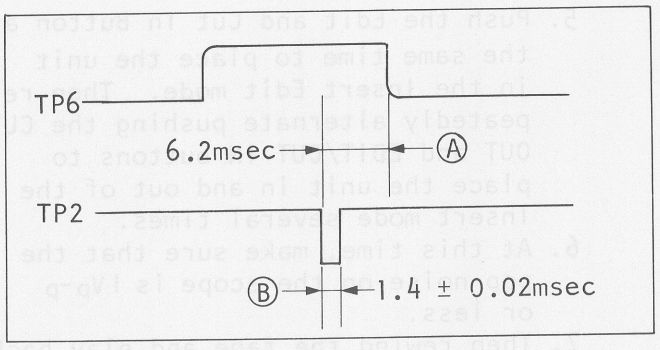


Fig. E74-a

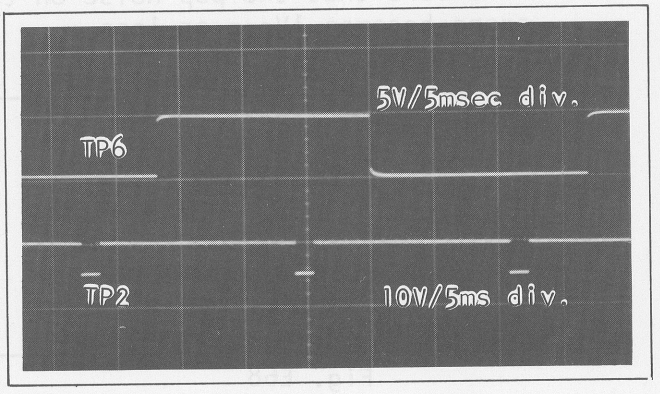


Fig. E74-b

5. Adjust R66 so that the pulse width at TP2 becomes 1.4 ± 0.02 msec as shown in Fig. E74.

5-5. Rotary Erase Current Adjustment

Test Point: TP1, TP2 (GND) (VEP00537).
Adjustment: R196
Mode: Video Insert

1. Connect the scope to TP1 (Hot) and TP2 (GND) on the Rotary Erase Current Circuit Board (VEP00537) which is located above the upper cylinder unit.
2. Supply a Color Bar signal to the Video Input on the rear panel.
3. Place the unit in the INSERT mode.
4. Adjust R196 so that the Rotary Erase voltage becomes 360 mVp-p.

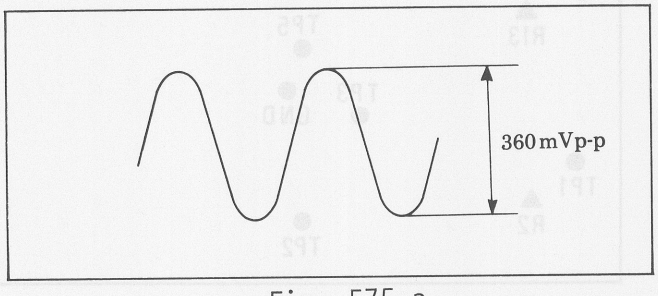


Fig. E75-a

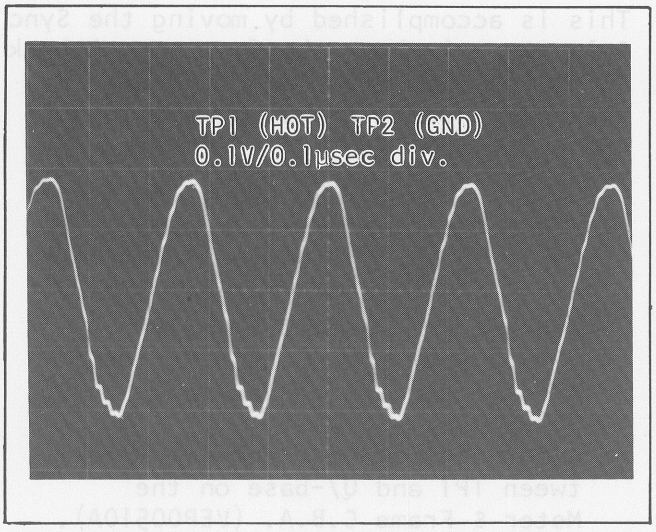


Fig. E75-b

6. Meter & Frame Circuit.

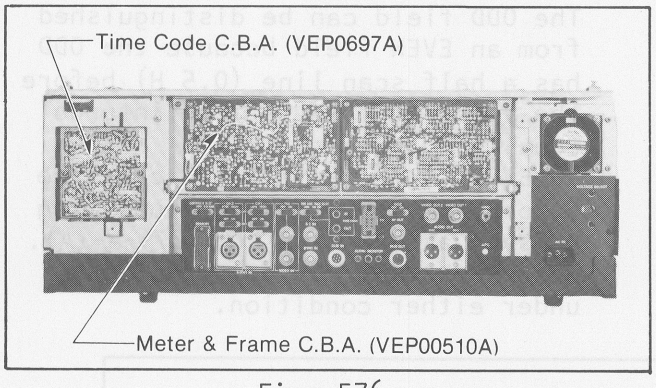


Fig. E76

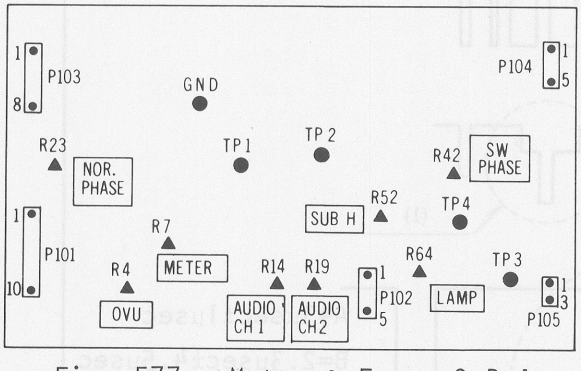


Fig. E77 : Meter & Frame C.B.A. (VEP00510A)

6-1. Audio Meter Adjustment

Test Point: TP5 (Audio C.B.A.),
TP11 (Audio C.B.A.)
Audio Meter

Adjustment: R14 (CH1)
R19 (CH2)

Mode: E-E

1. Supply a 1 kHz sine wave signal at -20 dB to the Audio Input CH1 and CH2.
2. Connect the scope to TP5 on the Audio C.B.A. (VEP0452A1).
3. Adjust CH1 MAN GAIN, R6334 on the front panel so that the signal becomes 2.83 Vp-p.
4. Then adjust AUDIO CH1, R14 on the Meter & Frame C.B.A. (VEP00510A) so that the Audio CH1 Meter on the front panel shows OVU.
5. Connect the scope to TP11 on the Audio C.B.A. (VEP0452A1).
6. Adjust CH2 MAN GAIN, R6333 so that the wave form becomes 2.83 Vp-p.
7. Then, Adjust AUDIO CH2, R19 so that the Audio CH2 Meter on the front panel shows OVU.

6-2. Video Meter Adjustment

Test Point: Video Meter

Adjustment: R4, R7

Mode: E-E

1. Supply a color bar signal to the Video Input on the rear panel.
2. Turn VIDEO OVU (R4) and VIDEO METER (R7) fully clockwise.
3. Set the AGC/MAN Select Switch on the front panel to the MANUAL Mode and fully turn VIDEO GAIN, R6337 on the front panel counter-clockwise.
4. Adjust VIDEO METER, R7 so that the Video Meter shows A point.
5. Then set the AGC/MAN Select Switch to the AGC Mode.
6. Adjust VIDEO OVU, R4 so that the Video Meter shows B point.

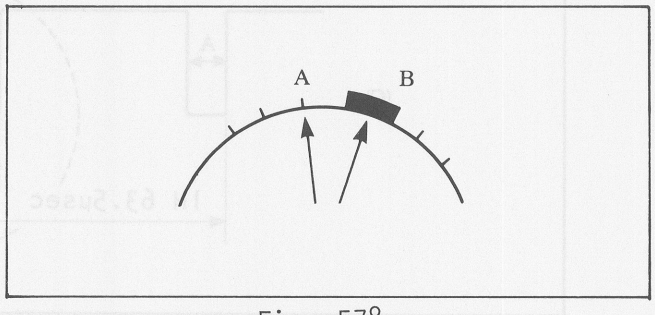


Fig. E78

6-3. Framing Servo Adjustment

Test Point: TP1 (VEP0385A1)
TP1 (VEP00510A)
TP7 (VEP0385A1)

Adjustment: R406 (VEP02100B1)
R23 (VEP00510A)

Mode: REC/PLAY
Input Selector: LINE
Sync Selector: NORMAL, EXT
Frame Detect SW: OFF

The framing servo adjustment is made to assure that when the frame detector is ON, the servo circuits will use the vertical sync of the ODD field of the incoming video as a reference. In this way, a tape previously recorded with the frame detector switch ON can be edited (also with the frame detector switch ON) without 0.5H error or "tearing". This means that if the last desired video head-sweep BEFORE AN EDIT was an ODD field, the EDIT WILL START with an EVEN field, and vice versa. The adjustment starts with the frame detector switch in the OFF position. The servo has a 50% chance of locking up to the ODD field and a 50% chance of locking up to an even field. The adjustment can be made when the servo has locked to either field, but it is a good idea to check the other case.

This is accomplished by moving the Sync Selector switch on the front panel back and forth from external to normal in the chance that the servo will lock to the opposite field.

1. Supply a color bar signal to the Video Input on the rear panel.
2. Supply a composite sync singal to the Sync Input on the rear panel.
3. Connect the scope CH1 to TP1 (VEP00510A) and CH2 to TP1 (VEP 0385A1) and set the scope to the CHOP mode.
4. Disconnect the cut point (CP) between TP1 and Q7-base on the Meter & Frame C.B.A. (VEP00510A).
5. Place the unit in the Rec mode with tape running.
6. Set the scope to the delayed mode and expand the vertical interval. An ODD or EVEN field at TP1 (VEP0385A1) will be observed.

The ODD field can be distinguished from an EVEN field because the ODD has a half scan line (0.5 H) before the start of the vertical internal equalizing pulses.
An EVEN field has a full scan line before the start of the equalizing pulses, as shown in Fig. E79-a-(A).
The adjustment may be performed under either condition.

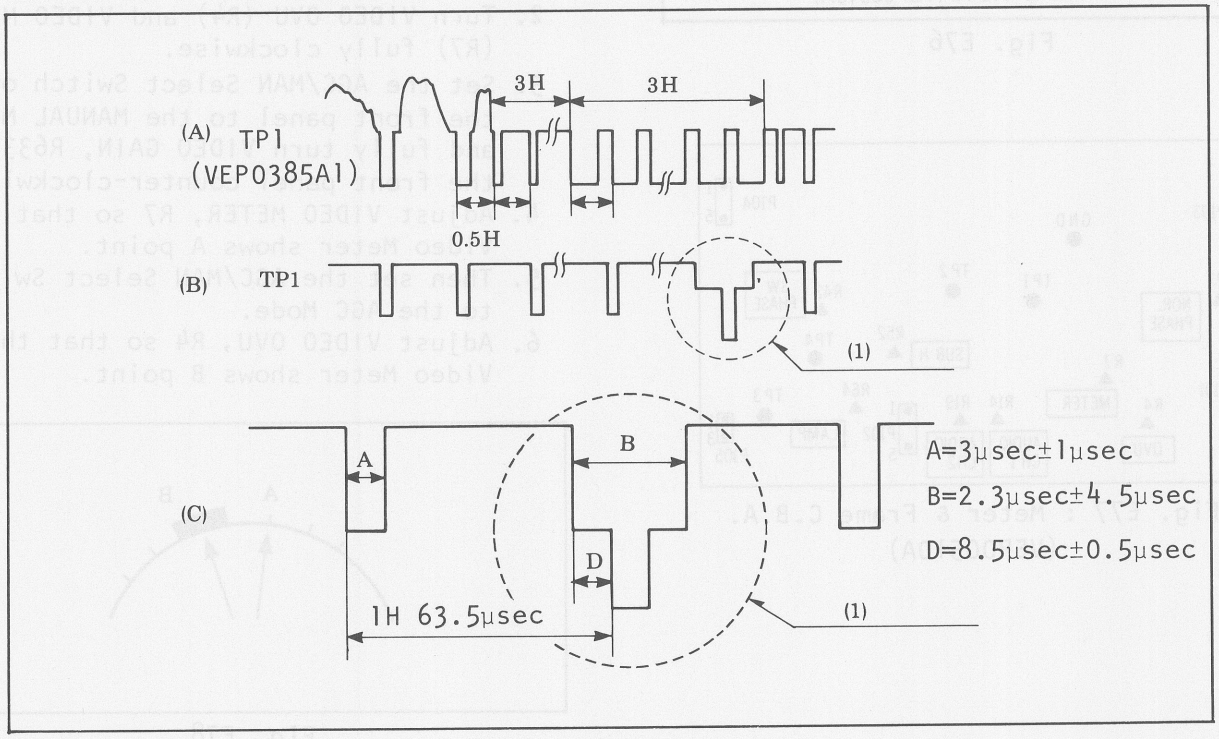


Fig. E79-a

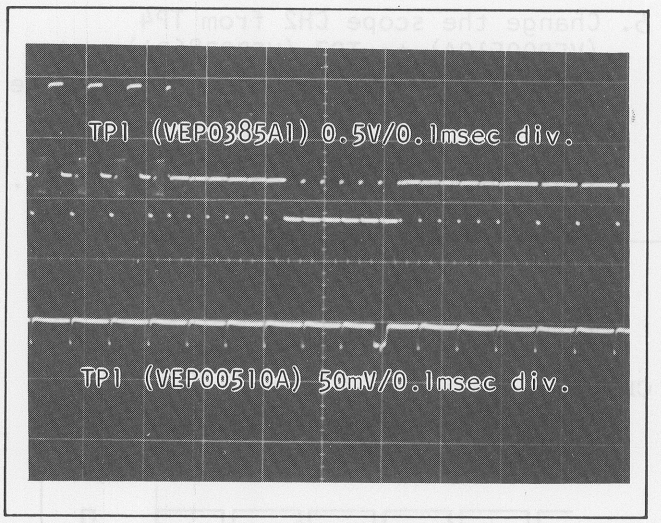


Fig. E79-b

7. If the servo has locked up to the ODD field, there will be a large pulse in the waveform of TP1 (VEP00510A) as shown in Fig. E79-a-(B), or Fig. E80-a-(B).
   If the servo is locked to an EVEN field, the waveforms will appear as in Fig. E80.
8. Be sure the Sync Selector is in the Normal mode, and adjust NORMAL PHASE, R23 so that the waveform appears as shown in Fig. E79-a-(C) for the ODD mode, or Fig. E80-a-(C) EVEN field.
9. Set the Sync Selector from Normal to External.
10. Adjust R406 (VEP02100B1) in similar fashion, following Fig. E79-a-(C) or Fig. E80-a-(C) depending on the lock mode.
11. Reconnect the TP1 Q7-base CP on the Meter & Frame Circuit.
12. Turn on the FRAME DET SW and make a recording. Playback the portion just recorded and confirm that the field at TP1 (VEP0385A1) and TP7 (VEP0386B1) are the same field.

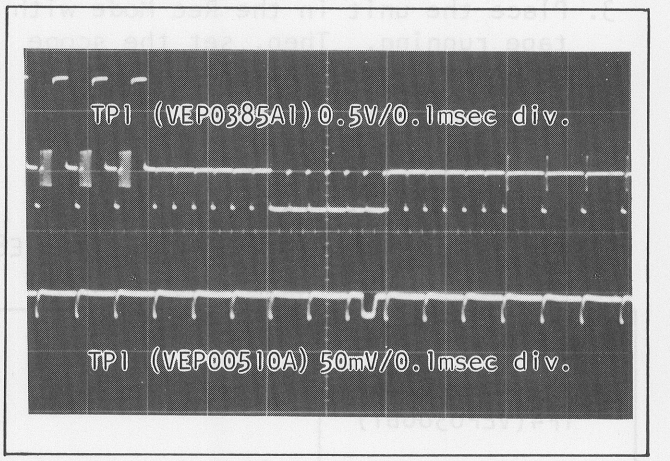


Fig. E80-b

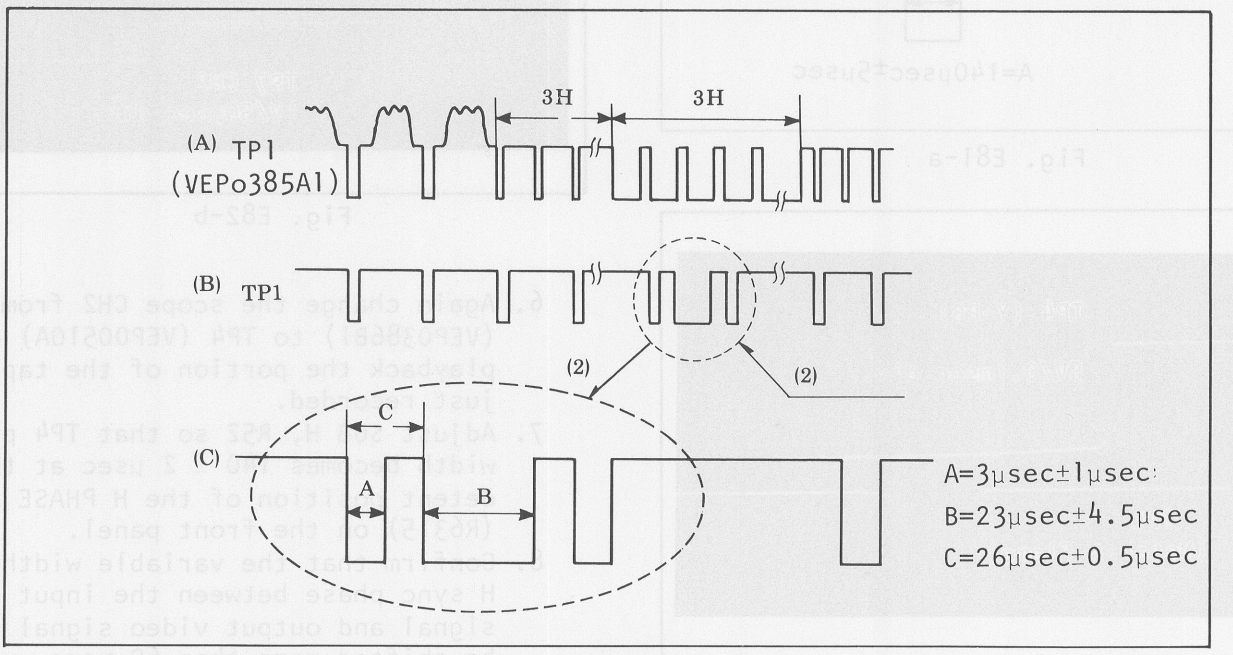


Fig. E80-a

6-4. H Phase Adjustment

Test Point: TP4 (VEP00510A)
TP4, TP7 (VEP0386B1)
Adjustment: R42 (SW PHASE)
R52 (SUB H)
Mode: Rec→Play
Input Selector: LINE
SYNC Selector: NORMAL
Frame DET SW: ON

1. Supply a color bar signal to the Video Input on the rear panel.
2. Connect the scope CH1 to TP4 on the Video Playback C.B.A. (VEP0386B1) and CH2 to TP4 on the Meter & Frame C.B.A. (VEP00510A).
3. Place the unit in the Rec Mode with tape running. Then, set the scope to delay mode at a falling edge of the head switching pulse of TP4 (VEP0386B1).
4. Adjust SW PHASE, R42 so that the pulse width at TP4 (VEP00510A) becomes 140 µsec as shown in Fig. E81.

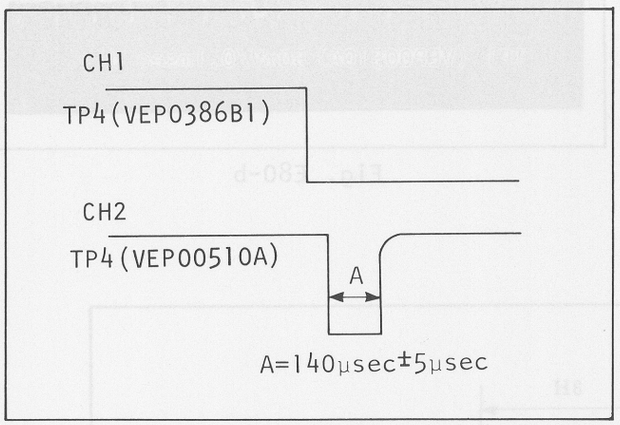


Fig. E81-a

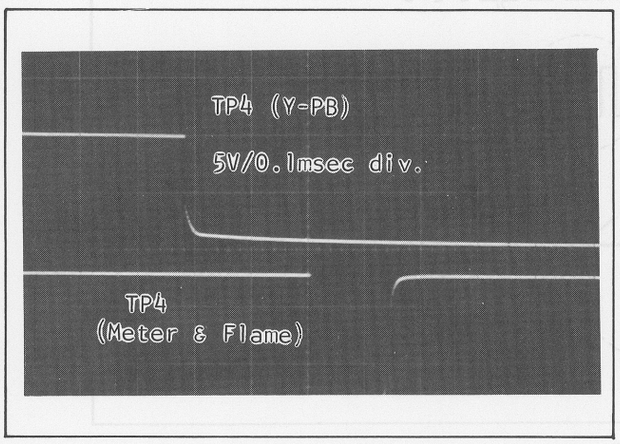


Fig. E81-b

5. Change the scope CH2 from TP4 (VEP00510A) to TP7 (VEP0386B1) and adjust the Record Shifter R207 on the Servo Circuit Board (VEP02100B1) as shown in Fig. E82.
Continue recording for a few minutes.

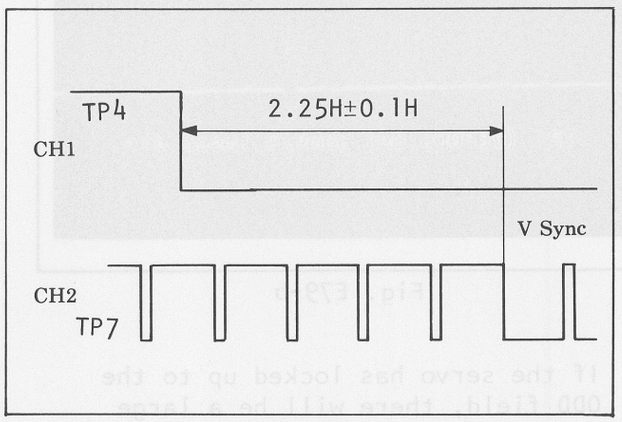


Fig. E82-a

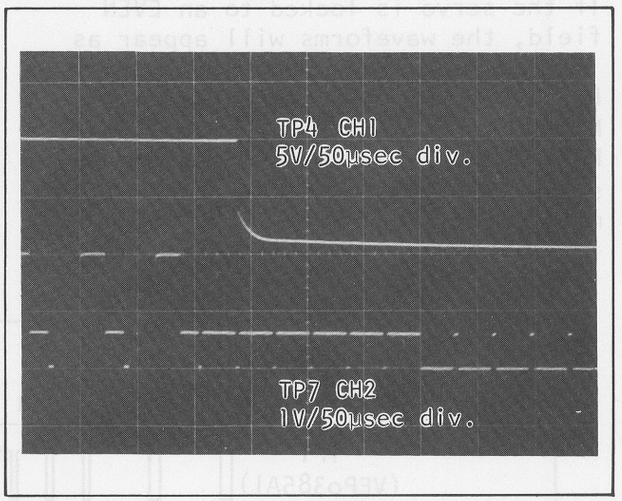


Fig. E82-b

6. Again change the scope CH2 from TP7 (VEP0386B1) to TP4 (VEP00510A) and playback the portion of the tape just recorded.
7. Adjust SUB H, R52 so that TP4 pulse width becomes 140 ± 2 µsec at the detent position of the H PHASE Adjust (R6315) on the front panel.
8. Confirm that the variable width of H sync phase between the input video signal and output video signal can be shifted more than 60 µsec.

6-5. Frame Lock Lamp Adjustment

Test Point: TP1 (VEP0385A1)
TP7 (VEP0386B1)
Frame Lock Indicator

Adjustment: R64 (LAMP LEVEL)

Mode: Rec→Playback

Frame DET SW: ON

TRACKING: FIX

1. Supply a color bar signal to the video input on the rear panel.
2. Make a recording for a while and playback the portion just recorded.
3. Connect a scope CH1 to TP1 on the Video Recording C.B.A. (VEP0385A1) and CH2 to TP7 on the Video Playback C.B.A. (VEP0386B1) and set the scope CHOP mode.

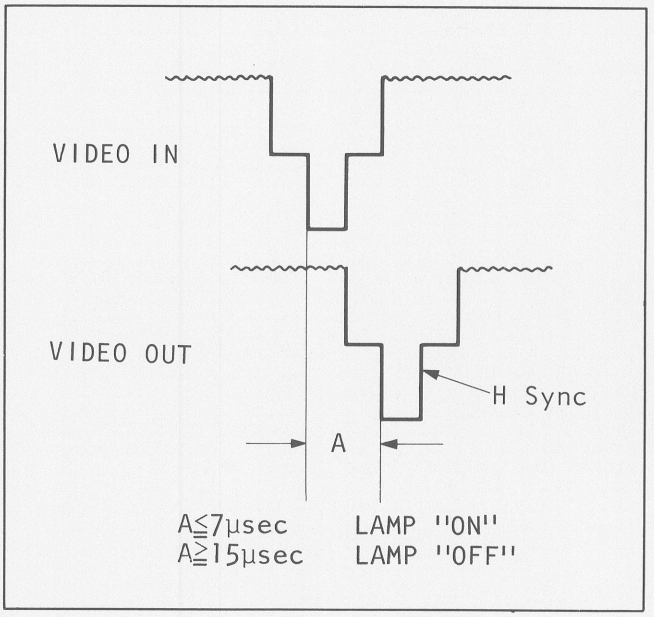


Fig. E83-a

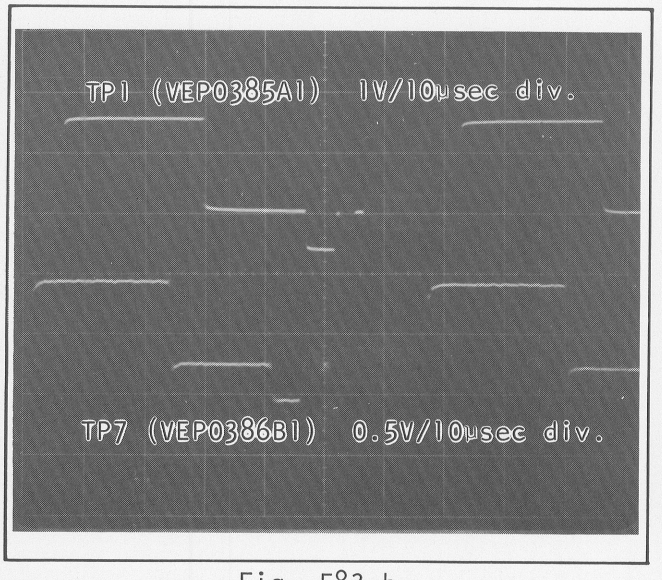


Fig. E83-b

4. Adjust H PHASE (R6315) so that the gap width between the falling edge of H sync pulse of the input video signal and that of the output video signal becomes ±7 μsec as shown in Fig. E83-b.
5. Adjust LAMP LEVEL (R62) so that the Frame Lamp turns ON.
6. Next, adjust H PHASE (R6315) so that the gap width becomes ±15 μsec, shown in Fig. E83-c.
7. Readjust LAMP LEVEL (R62) so that the Frame Lamp turns OFF.
8. Confirm operation within these limits.

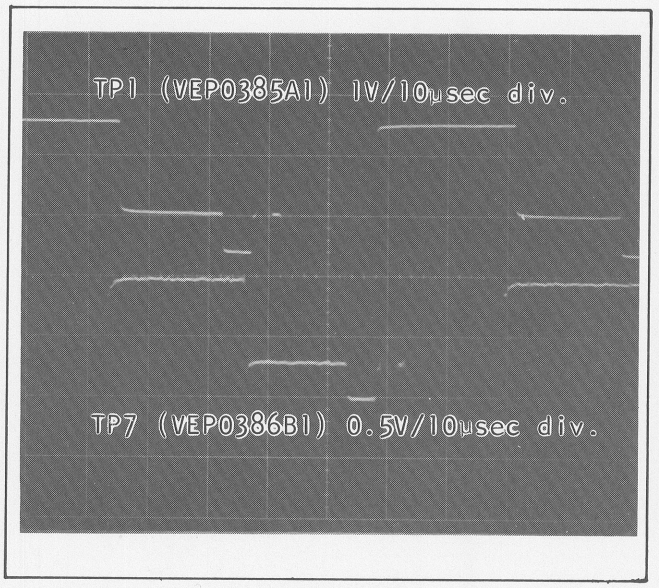


Fig. E83-c

NOTES

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